FORESTRY ABSTRACTS

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EDITORIAL NOTE

Transliteration of Cyrillic characters. It will be recalled that in 1951 [see *F.A.* 13 p. 3] the British Academy system of transliteration was abandoned in favour of a modified Damiani system as used within the Commonwealth Agricultural Bureaux organization. In the meantime, efforts towards international standardization have culminated in the publication by the International Organization for Standardization (ISO) of an International System for the Transliteration of Cyrillic Characters (*ISO Recommendation* R.9, Sept. 1954), which is to be incorporated in a forthcoming *British Standard.* It differs from the Damiani system used in Volumes 13–18 only in minor points. In view of its international character and its acceptance by the British Standards Institution, this system is being adopted in *F.A.* from the present issue on. The few differences will not be noted here, as full transliteration tables, from Cyrillic to Roman and vice versa, are being published in the revised and enlarged edition of the *Guide to the Use of Forestry Abstracts*, which will appear almost simultaneously with the issue of this number.

NOTES ON PROGRESS IN FOREST SCIENCE

PART I: FORESTRY PROPER (INCLUDING DAMAGE TO TIMBER)

Such is the volume and diversity of scientific literature in this day and age, that the scientist finds it well-nigh impossible, even with the help of abstract journals, to keep abreast of progress in his particular speciality; much less is he able to follow progress outside it. In the field of forestry, the literature of which still continues to expand and diversify, this journal has sought to meet the researcher's primary need, not only through abstracts, but through the regular publication of leading articles reviewing comprehensively the advances made in particular fields. His secondary need—for some awareness of progress in other branches of his science—has so far gone unfulfilled. It is the purpose of these notes to help remedy the omission. Their limitations must accordingly be borne in mind. They are written expressly for the research worker interested in the work of other researchers; they do not pretend to give him a detailed review of his own field; and in view of the tremendous scope of forest science and our limitations of space, they are necessarily highly selective. If they are well received, it is proposed to issue them every three years, with the first number of the appropriate volume.

TREE PHYSIOLOGY

Use of radio-active tracers in physiological studies. Uptake of radio-active P by plants has been shown to be related to the distance of the plant from the source, both with 15-year-old Spruce when it was applied at different distances [*F.A.* 16 No. 3769] and with Oak seedlings when applied at different depths at the time of sowing [*F.A.* 18 No. 1517]. Uptake by *Abies alba* was faster through shallow lateral roots than through the tap-root, and was accelerated in mycorrhizal roots [*F.A.* 18 No. 84]. Translocation into the branches of *A. alba* was strongly affected by light, and with Poplar seedlings [*F.A.* 17 No. 1202] uptake through the roots usually reached a maximum at 3 p.m. Poplar and Willow cuttings accumulated radio-active growth regulators mainly in the basal portion, especially that part immersed in the liquid [*F.A.* 16 No. 2655]. P^{32} absorbed through the roots of Scots Pine, accumulated chiefly in meristematic tissue in needles, buds and bud traces, and in the phloem and cambium [*F.A.* 18 No. 1282]. A substantial movement of previously deposited Ca^{45} into newly developed buds of *Pinus monticola* has been noted [*F.A.* 18 No. 1281] and in the same species radio-active Ca and P moved more rapidly, and radiation in phloem and bark was less uniformly distributed and more intensive, in trees suffering from pole blight than in healthy trees [*F.A.* 16 No. 80]. In studies of Oak wilt, radiation has been found in seedlings inoculated with fungus cultured on radio-active media [*F.A.* 16 No. 1919], and radio-active isotopes, used to study translocation in diseased Oaks, have effectively demonstrated the plugging of vascular tissues [*F.A.* 16 No. 1918]. Radio-active NH_4 sulphamate applied to the stem of young plants in frills or girdles moved rapidly upwards and slowly downwards, apparently in the xylem and phloem respectively [*F.A.* 16 No. 4206]. Translocation of nutrients through natural root grafts of Pine [*F.A.* 16 No. 231] and of Oak species [*F.A.* 18 No. 1283] has also been demonstrated.

Many further studies have been made, using isotopes, on the role of mycorrhizae in nutrient uptake [*F.A.* 16 Nos. 226–7, 1511, 3876, 3878; 17 No. 1334; 18 No. 3786] and on the fixation of radio-active N by nodulated plants of Alder, *Myrica gale* and *Hippophaë rhamnoides*.

Isotope studies have begun on the role of lignin precursors, introduced into Spruce, in the lignification process [*F.A.* 17 No. 825; 18 No. 1325]. When CO_2 labelled with C^{14} was introduced by assimilation into young Scots Pine, the radio-activity of the resin reached a maximum after a few days and then fell; the amount of resin removed by tapping appeared to be only a small proportion of the resin formed [*F.A.* 18 No. 2476].

The water demand of trees and stands: transpiration. A number of studies have been made on external factors affecting transpiration. An American experiment [*F.A.* 17 No. 1204] showed that transpiration of Plum and Pine grown in a tank sealed to prevent surface evaporation, is not affected by the amount of water in the soil as long as this remains above the wilting %. In the Ukraine [*F.A.*17 No. 1207], in a 17-year plantation of Oak, *Fraxinus pennsylvanica* and Norway Maple, watering after prolonged drought at the rate of 300 litres per tree, the soil being wetted to a depth of 30–40 cm., was always followed by increased transpiration, highest and most rapid when the preceding period of drought had been short; *F. pennsylvanica* showed the most marked response. A. A. Silina [*F.A.* 17 No. 1208] found, in a pure 10-year Oak stand and a mixed 12-year hardwood stand with Aspen predominating, a high correlation between transpiration and air temperature only for trees not suffering from suppression; total transpiration for the growing season was estimated, using Ivanov's cut-shoot method, at 218 and 397 mm. respectively from the two stands, as compared with a total rainfall for the period of only 151 mm. From estimates of water balances, Smirnov and Odinokova concluded that the woody vegetation of dense mixed Aspen stands transpired respectively 203, 230, 201 and 185 mm. during the whole growing season at ages of 8, 25, 37 and 63 years [*F.A.* 16 No. 2620]. Koch [*F.A.* 18 No. 2473], in a study of the relationship between transpiration and dry-matter production, found a marked rise in their ratio [his 'transpiration productivity'] in needles of Spruce and Silver Fir suffering from SO_2 damage.

In Venezuela, Vareschi has used transpiration measurements, combined with a study of recovery after complete artificial defoliation equivalent to that caused by extreme drought, in selecting species for afforesting bare eroded slopes [*F.A.* 17 No. 1299]. Measurements in 13- and 20-year stands during July and August in the U.S.S.R. showed that *Fraxinus excelsior* has too high a moisture requirement to be a suitable associate for Oak, although *F. pennsylvanica* and *Acer platanoides* can safely be used with Oak [*F.A.* 16 No. 2659].

Russian experiments with shoots cut from Oak seedlings and nursery stock [*F.A.* 17 No. 1209] and exposed during the winter, showed too slight a water loss for water deficiency to be a cause of death. In American greenhouse experiments, Ponderosa Pine seedlings in dry soils survived far longer when exposed at night to a mist spray, simulating dew [*F.A.* 16 No. 3867; 17 No. 1328]. When Ponderosa Pine seedlings with their roots washed, dried and tightly sealed in flasks, were turned upside down and exposed to a continuous spray, the roots shrivelled but the tops stayed green for 31 days and some grew needles, while water accumulated in the flasks [*F.A.* 17 No. 1327]. In further similar experiments [*F.A.* 18 No. 1279] water moved back through the plant and out at the roots only if the temperature fluctuated, suggesting that the movement results from a vapour-pressure gradient. In experiments with *Pinus echinata* in which top and roots of 1-year seedlings were sealed in separate flasks with different vapour pressures, water was absorbed and transferred from top to root or vice versa, according to the direction of the diffusion gradient [*F.A.* 18 No. 3695].

SYSTEMATIC BOTANY

It is not possible here to review the many papers that deal with regional taxonomic studies, beyond noting that important contributions have been made to the floras of the Malaysian and African regions in particular. For the latter region, an event of great significance has been the formation of a special international association, the Association pour l'Étude Taxonomique de la Flore d'Afrique Tropicale (A.E.T.F.A.T.), which is publishing an annual index of papers on systematic phanerogamy and new taxa for Africa south of the Sahara, of which three issues have appeared [*F.A.* 16 Nos. 1452, 3823; 18 No. 134].

Much of the remaining taxonomic literature is too narrow in scope for the notes that follow: these will deal with a selection of papers that are interesting examples of different approaches to taxonomic problems in a few important tree genera.

Picea: Wright [*F.A.* 17 No. 2471] has made a particularly interesting study of species crossability in relation to distribution and taxonomy in *Picea:* of 70 interspecific crossings 16 were successful, 12

doubtful, and 42 failures; 14 of the successes involved species morphologically similar or from neighbouring regions, or both, and 37 of the failures involved morphologically distinct species with widely differing ranges. Tabular comparisons are made of the morphology of 31 species and of the number of characters by which each species differs from each of the others. The evidence collected indicates that previously recognized sections of the genus are artificial, and Wright sees no grounds for any such sectional divisions. He concludes that: (1) *P. glauca*, *P. engelmannii*, *P. pungens* and *P. sitchensis* have a common, relatively recent origin, and are probably connected with Old-World species through *P. jezoensis*. (2) *P. mariana* and *P. rubens* are closely related. (3) *P. abies*, *P. koyamai* and the *P. asperata* and *P. likiangensis* complexes are closely related and have a recent common origin; *P. obovata*, however, does not fit into this group morphologically, though crosses were moderately successful. (4) Of the 6 Japanese species, each has its nearest counterpart in different S. Chinese species. The genus probably originated in N.E. Asia, and *P. koyamai* is perhaps the oldest type. It remains to be seen whether taxonomists agree with these conclusions. Sudo [*F.A.* 18 No. 856], in a study of the wood anatomy of 18 species of *Picea*, was able to divide them on this basis into 3 groups which cut across Rehder's sections [but also seem to bear no close relation to Wright's phylogenetic deductions].

Tsuga: In a paper published in 1948, van Campo and Gaussen had claimed that several species of *Tsuga* were intergeneric hybrids with *Picea* or *Keteleeria*, e.g. *T. hookeriana* (*T. mertensiana*) was held to represent *T. heterophylla* × *P. sitchensis*, and was re-named *Tsugo-Picea hookeriana*. Vabre [*F.A.* 16 No. 121] found confirmation of this view from a study of seedlings of *T. hookeriana* and its reputed parents; she has also studied this 'hybrid' cytologically, though no very conclusive evidence resulted [*F.A.* 17 No. 2485]. A further paper by van Campo [*F.A.* 17 No. 1228] reaffirms the parentages given in the first paper. Meanwhile the U.S. Check List [*F.A.* 15 No. 2302] places the hybrid names proposed for the American material as synonyms under *T. mertensiana*.

Pinus: Field and herbarium studies of *Pinus halepensis* s.l. are reported by Czeczott [*F.A.* 16 No. 196], who treats *P. halepensis* s.s. and *P. brutia* as distinct, though they give rise to intermediates where they overlap in the Aegean islands and N. Syria, or where they are planted together. She regards *P. pithyusa*, *P. stankeviczii*, and probably *P. eldarica* as synonyms of *P. brutia*. Vidaković [*F.A.* 16 No. 1462] gives diagnostic differences in needle anatomy between *P. halepensis* and *P. brutia*, and Kayacik [*F.A.* 17 No. 3696] deals with their ranges in Turkey. Further support for the specific distinction comes from Mirov [*F.A.* 17 Nos. 1049, 3668], whose analyses show that turpentine of *P. halepensis* is dextro-rotatory and may be characterized by absence of β-pinene and d-Δ^3-carene, whereas that of *P. brutia* is laevo-rotatory and contains both of these terpenes. *P. pithyusa* also shows a high content of d-Δ^3-carene, but the other segregates have not yet been analysed. Mirov has reviewed results for the *Diploxylon* and *Haploxylon* groups of *Pinus* [*F.A.* 15 No. 970; 18 No. 2528]; he continues to publish, mostly in collaboration with Iloff, analyses for many individual species and some hybrids [*F.A.* 16 Nos. 2505–6, 3606; 17 Nos. 1048–9, 2276; 18 Nos. 112, 1155, 2299, 2529]. He concludes that turpentine composition is highly specific and that where deviations occur they may be ascribed to confusion of taxa or to the existence of chemical mutants or hybridity. On the whole, the results support the classification adopted in Shaw's monograph of 1914. Papers on turpentine composition by other authors are of possible interest in this connexion [*F.A.* 16 Nos. 1244, 2507; 17 Nos. 1054, 2227–8; 18 Nos. 1154, 2534].

Eucalyptus: Several important publications on this genus have been issued in Australia. A supplement to Blakely's key reproduces original descriptions of 35 new species and gives one re-description [*F.A.* 16 No. 172], and the key itself has been re-issued in a revised and enlarged edition covering 522 species and varieties [*F.A.* 17 No. 3683]. In addition a card-sorting key (551 cards), with accompanying instructions and supplementary information, has been prepared [*F.A.* 16 No. 2715]. Summaries of general information on 100 species have been compiled [*F.A.* 16 No. 2733], and mention should also be made of a general bulletin on Eucalypts for planting, put out by FAO in English and French [*F.A.* 16 No. 1475; 17 No. 1289]. Chattaway has published several papers on the bark anatomy of the genus and its sections [*F.A.* 15 No. 1741; 16 Nos. 4492–4; 17 Nos. 1942–3]. A series of interesting papers have also appeared on hybrids and the genetics (including inheritance of wood and bark characters) of various Eucalypts [*F.A.* 16 Nos. 1415, 1441, 2687, 3811; 17 Nos. 148, 1259, 2480; 18 Nos. 1320–1, 2507, 3719–21].

Nothofagus: The Third Archbold New Guinea Expedition discovered extensive montane rainforests in which Fagaceae, especially *Nothofagus* spp., are dominant. A detailed study of these was published by van Steenis [*F.A.* 15 No. 1140]; he recognized 16 Papuan species, constituting a new subsection (*Bipartitae*) of the genus. Dadswell and Ingle have since reported [*F.A.* 16 No. 2145] that the genus can be divided by features of wood anatomy into two distinct groups of species, one comprising the New Guinea species, and the other the temperate species of S. America, New Zealand

and Australia. Five species from New Caledonia, classified by Baumann-Bodenheim under *Trisyngyne*, have been transferred by van Steenis [*F.A.* 16 No. 162] to the new subsection of *Nothofagus*, and a study by Cookson and Pike of 12 New Guinea and 3 New Caledonian species has shown that the pollen of the *Bipartitae* is distinct from that of the temperate *Nothofagus* spp. and conformable to van Steenis' views [*F.A.* 17 No. 1229]. The morphology of *Nothofagus* pollen has also been the subject of two further papers [*F.A.* 18 Nos. 94–5].

Leguminosae: From preliminary studies of African genera, Gilbert and Léonard [*F.A.* 16 No. 107] find that 'good' genera seem to have seedlings with well defined characteristics. They suggest as a working hypothesis that differing seedling types within a 'genus' may indicate a need for generic segregation (e.g. *Macrolobium caeruleum* has aberrant seedlings and is also aberrant in other characters), whereas a uniform seedling type in related genera may support a reduction (e.g. of *Pterygopodium* to *Oxystigma*). Pollen studies by Erdtman [*F.A.* 17 No. 1230] in *Macrolobium* s.l. enabled S. American species to be distinguished from African; the material examined included African species of the recently segregated genera *Gilbertiodendron* and *Pellegriniodendron*, but no difference in pollen morphology between these and *Macrolobium* s.s. could be established.

SILVICULTURE

In a subject so wide-ranging and diverse, and one, moreover, in which developments are often recorded for single species or small groups of species, only a few, rather discrete topics can be touched on. It is of interest that the Pines, more particularly Scots Pine, the 'Southern' Pines of the U.S.A. and those species, like *P. radiata* and *P. pinaster*, most used as exotics in the Southern hemisphere, are the subject of more papers than any other genus, with *Picea*, *Quercus* and *Populus*, in that order, a long way behind.

Stand structure. New ideas on the characterization of stand structure—its constitution and composition—have been put forward, especially in Germany [*F.A.* 18 Nos. 288–9, 294] but also in Rumania [*F.A.* 18 No. 1448], Switzerland [*F.A.* 18 No. 295] and elsewhere. Köstler stresses the need for different methods of analysing stand structure at different stages of development, illustrating his own methods and their value in silvicultural assessment by graphic analyses of mixed selection forests in Germany and Austria [*F.A.* 17 No. 1447]. Both Leibundgut and Olberg expand their proposals to characterize thinning treatments [*F.A.* 18 Nos. 415–6]. Connected but more fundamental and revolutionary in approach is the growth-rate classification proposed by Nesterov and Voropanov, disciples of the 'dynamic' Mičurin-Lysenko school, involving the recognition of 'physiologically young' and 'physiologically old' trees, irrespective of their crown class. These concepts have evoked much controversy in Russia itself [*F.A.* 17 No. 407] and some sober appraisal elsewhere [*F.A.* 18 No. 2688], while practical applications are being studied for Scots Pine, both in Russia [*F.A.* 18 No. 4059] and E. Germany [*F.A.* 18 No. 775].

Seed collection. With the continued rise of interest in softwood planting, many studies have appeared on seed collection, particularly tests for ripeness in cones [*F.A.* 16 Nos. 1630, 2882; 17 No. 3851; 18 No. 345].

The use of X-ray photography in seed testing is further examined in several papers [*F.A.* 17 No. 332; 18 Nos. 349–50, 3958]; another paper [*F.A.* 17 No. 2708] gives the results of extensive testing of Spruce seed, showing close correlations with laboratory germination. To the original claims that this method reveals empty seeds, absence of embryos, stage of embryo development and embryo length and abnormalities, is now added a claim to reveal physiological condition. This is based on the extent to which a $BaCl_2$ solution penetrates the seed; only if it penetrates less than one-quarter of the endosperm can the seed be considered viable [*F.A.* 18 No. 3958].

Chemical weed control. Work continues with a variety of oils, growth regulators, and other phytocides for the control of weeds in nurseries, for eliminating weed trees and even for 'pruning', i.e. killing unwanted branches and epicormics (Oak and Beech) [*F.A.* 18 No. 4075]. Interest in nursery weed control is especially marked in Great Britain, Scandinavia and the U.S.A. Apart from pre- and post-emergence applications now under full operational test in several nurseries, the U.K. Forestry Commission has initiated special studies of the residual effects of drastic treatments of fallows, and of the repeated treatment of beds, on subsequent seedling crops. The application of vaporizing oil as a pre-emergence spray has reduced the cost of weeding by 50–70% in the season of treatment, and post-emergence spraying with white spirit by another 20%, as compared with hand-weeding. Treatment of fallows with $NaClO_3$ (300 lb./200 gal. water/acre) was highly effective against annual weeds; perennial weeds proved more resistant. Neither $NaClO_3$ nor Na TCA (the latter less uniform in effect) appears to leave harmful residues [*F.A.* 17 No. 1491].

Further use of 2,4-D ethyl sulphate, which develops herbicidal properties only when broken down

to 2,4-D by soil micro-organisms, is reported from regions as far apart as Queensland and Italy [*F.A.* 17 No. 2721; 18 No. 361]. Vapam (Na *N*-methyl dithiocarbamate dihydrate), as a pre-emergence drench at 4 quarts/100 sq. ft., has given complete control for 35 days and 91% control for 60 days in 'Southern' Pine and hardwood seedbeds [*F.A.* 18 Nos. 1528–9].

Vegetative propagation. In connexion with genetical work on conifers, many experiments are reported on vegetative propagation by cuttings and grafts, particularly for Pines. The best methods of selecting and raising cuttings of *Pinus radiata* are being intensively investigated in Australia [*F.A.* 16 No. 4019], and in several countries new techniques are under further test, e.g. regulating devices to secure intermittent misting, out of doors and in the greenhouse [*F.A.* 16 No. 1671; 18 No. 2767]; the use of galvanized iron tubes for *P. radiata* cuttings [*F.A.* 16 No. 4019] and of root-shoots from tubed *Agathis palmerstonii* [*F.A.* 17 No. 2740]; and the storage and sea-borne transport of Pine scions in sealed, perforated, polyethylene bags with a dry-sphagnum/moist-moss packing—copied from commercial shipping practice [*F.A.* 18 No. 2766].

In Canada, deep-freeze (0° F.) storage of winter-collected Red Pine scions has given greater success in grafts on Scots Pine made the following June, than ordinary cold storage; of a number of coverings tried on these grafts, a polyethylene bag covered with a kraft-paper bag was best [*F.A.* 17 No. 3890]. The effect of chilling (open frame) and non-chilling (greenhouse) of the rootstock has been studied with Spruce, the former proving superior as regards the healthy shoot length and survival of scions [*F.A.* 18 No. 2772].

Grafting of succulent shoots, with a polyethylene sleeve for protection, appears to promise a high % of takes and a prolonged grafting season for Slash Pine [*F.A.* 16 No. 411]. Trials of new materials for transplant pots are reported from France and Algeria (polyethylene tubes and bags) and from the Belgian Congo (open-ended, wire-mesh cylinders) [*F.A.* 18 Nos. 1552, 2778, 3997].

Aerial sowing. Direct sowings from plane and helicopter are being increasingly tried, e.g. in Finland with conifers [*F.A.* 16 Nos. 422–3, 1685], in Oregon with Douglas Fir and Western Red Cedar [*F.A.* 16 No. 2941], and in the Philippines with *Leucaena glauca* [*F.A.* 18 No. 2791], and interesting appraisals of results from aerial sowings done in 1939–41 have come from Russia for Scots Pine [*F.A.* 16 Nos. 2942–3] and Scots Pine, Norway Spruce and Larch [*F.A.* 16 No. 4039]. Emphasis is laid on the saving of labour and seed, on the differential effects of sites on success, and the advantages of ground preparation (e.g. floor burning and cultivation, whether deliberate or incidental to extraction). In one Canadian West Coast experiment, helicopters were used both for sowing (Douglas Fir and Western Hemlock) and for pre-baiting the area, plus a surround, with wheat treated with the rodent poison thallous sulphate. The operation proved highly successful [*F.A.* 16 No. 4038].

Repellents. Work on bird and rodent repellents continues. Against birds, seed treated with the anthraquinone compound 'Morkit' produced more than 10 times as many Longleaf Pine seedlings [*F.A.* 17 No. 3898]. A list has been compiled [*F.A.* 18 No. 1563] of possible substitute preparations where Morkit is unobtainable.

A similar difference in the number of milliacre plots stocked at 10 months was shown for direct sowings of Douglas Fir seed treated with tetramine as a rodent repellent [*F.A.* 18 No. 2783]. Previous work on tetramine treatment has been reviewed [*F.A.* 17 No. 3896], the Denver Wildlife Laboratory has published its work on the value of some 335 chemicals for seed treatment against rodents [*F.A.* 17 No. 580] and a symposium on this subject in the U.S.A. has also been reported [*F.A.* 16 No. 1942].

Enrichment of growing stock. In the tropics, the practice of enriching existing forest by sowing or planting valuable species in lines, strips or patches is spreading, though much of it, especially outside Africa, is still experimental. Reports from Africa include the Belgian Congo—strip planting of montane species in Ruanda, 10-m. spaced planting of *Terminalia superba* and *Chlorophora excelsa* in Ruanda and Kasai, strip planting of *T. superba* at Mayumbe, of *C. excelsa*, *T. superba*, *Khaya nyasica* and others in gallery forest, Katanga, and of *T. superba* in the S. Kasai [*F.A.* 16 Nos. 340, 2993, 3930; 17 No. 1554; 18 No. 2712]; the Ivory Coast—strip plantings of 7 local species [*F.A.* 16 Nos. 1268, 1275]; French Gaboon—strip sowings and plantings of *Aucoumea klaineana* [*F.A.* 16 No. 339]; and Nyasaland—underplantings of evergreen forest with *Widdringtonia whytei* on the Zomba plateau [*F.A.* 18 No. 2827]. Other reports include Malaya—group plantings of 13 local species in secondary forest [*F.A.* 16 No. 1726]; Trinidad—sowing and planting round charcoal sites with *C. excelsa* and other exotics [*F.A.* 17 No. 2662]; American Virgin Islands—patch sowings of *Swietenia macrophylla* [*F.A.* 17 No. 2771]; and other trials in the Caribbean [*F.A.* 17 Nos. 2681–2].

FUNGI

Disease: Fomes annosus. Much research continues on various aspects of this important pathogen of conifers, notably in Scandinavia and the U.K. A study of its economic effects on Norway Spruce in

Sweden showed that diseased trees invariably had poorer diameter and height growth and more taper than healthy trees, and that fast-growing trees tend to be attacked [*F.A.* 17 No. 1738]. This last conclusion is corroborated in Danish investigations of the susceptibility of Spruce growing on various heath soils and under various cultivation treatments, fertilizers, etc. Here one of the main conclusions reached was that marling favoured growth without increasing the incidence of the fungus; simple liming invited severe attack [*F.A.* 16 No. 3132; 17 No. 4093]. About half the actinomycetes isolated from Danish forest soils by Nissen showed antagonistic effects to *F. annosus* mycelium *in vitro*, one of them, a *Streptomyces* species, inhibiting growth [*F.A.* 18 No. 577]. In laboratory tests, basidiospores readily passed through layers of sand and soil 20–40 cm. thick. The fungus failed to grow on nearly all soils from 14 sites in Sweden, but after heat sterilization grew steadily on most of them. The inhibiting agent appeared to be of biological origin, unstable in water solution, and most stable at pH 5–5·5 [*F.A.* 18 No. 4228]. In a study of the infection paths used by some root fungi, it was found that *F. annosus* on Spruce could easily penetrate cork cells by single hyphae, and that rapid spread of infection occurred in the neighbourhood of wounds and lenticels, proceeding inwards through the rays; but in spite of a network of hyphae in the wood and cambium, only the heartwood showed signs of decay. *Armillaria mellea*, by contrast, was completely independent of wounds and lenticels for entry, even penetrating intact bark [*F.A.* 18 No. 1793]. Further research into the incidence of *F. annosus* in British forests has confirmed the close relation between stump infection after thinning and losses through the fungus, the first thinnings in young plantations, i.e. less than 16 years old, being particularly dangerous. Generally, thinning in late winter produced the highest proportion of infected stumps, and thinning in early summer the lowest, but in the dry summers of 1947 and 1955 summer infection was also heavy, presumably because *F. annosus* resists drought better than rival stump-colonizing fungi, notably *Peniophora gigantea*. Following trials with painting, creosoting and uprooting of stumps, which showed creosoting to be effective in controlling infection at low cost, creosoting was carried out on a large scale at first thinnings in East Anglia. For its fullest effect, it should be done immediately after felling or resin flow may prevent the creosote from penetrating fully [*F.A.* 18 No. 4225].

Timber decay in general. Recent advances in this field were reviewed in a leading article, appearing in *F.A.* 17 pp. 317–27, 477–86, by W. P. K. Findlay, who, with J. G. Savory, has clarified the problem of soft rot and the identity of the lower fungi causing it [*F.A.* 16 Nos. 1129, 2375].

Accelerated decay tests. These continue to receive attention. Satisfactory results were obtained with a method of determining the degree of decay by relating the density and chemical composition of conifer wood attacked by different fungi to the volume of solution consumed when the wood is heated with 0·1 *N* NaOH [*F.A.* 16 No. 1121]; another method relating nail-holding power to density and to the degree of decay was satisfactorily tested on creosoted railway sleepers [*F.A.* 16 No. 1122].

A rapid test for wood preservatives, based on static bending tests with a special instrument, has been developed in E. Germany; it is claimed that 1 week's drying of test pieces and 3 weeks' exposure to fungal attack will suffice for an evaluation, against 4–5 months for the present German standard test (DIN 52 176). Loss of static bending strength was found to vary almost linearly with loss of weight from the 3rd to the 8th week of exposure to *Coniophora cerebella* [*F.A.* 17 No. 3376].

Controlled decay. Claims are being made that the controlled decay of Beech wood by selected fungi (e.g. *Pleurotus ostreatus*, *Polystictus versicolor*) can produce a product ('Mykoholz') of low density, high porosity and good workability, suitable for pencils, artificial limbs, etc. [*F.A.* 18 No. 4703].

INSECTS

Selection of food and breeding sites. Various methods have been devised for the extraction, testing and identification of compounds in trees attracting or repelling certain insects. In Canada, Graham and Werner have published methods used by them for investigating the odoriferous compounds attracting ambrosia beetles to their specific hosts [*F.A.* 17 No. 4218]. In Germany, Görnitz treated certain herbaceous plants with tannin solutions in an attempt to single out the factor causing *Lymantria dispar* to choose trees rather than herbaceous plants for food. Some treated plants were accepted by the larvae but the results, on the whole, were inconclusive [*F.A.* 18 No. 4327]. In Germany also, Sandermann and Dietrichs devised a method of chromatographic analysis in which cardboard was used instead of paper in experiments to identify termite-repellent substances in wood extractives. The method permits the isolation by elution of quantities sufficient for termite testing and further analysis. By this means the active substance in *Paratecoma peroba*, *Tabebuia flavescens* and *T. ipe* was identified as lapachorone [*F.A.* 18 No. 4590]. Paper chromatographic analysis has also been used by Cachan on the Ivory Coast for investigating substances in *Macrolobium* spp. attracting the ambrosia beetle *Platyscapulus auricomus* [*F.A.* 18 No. 4711]. In a connected field of research, studies have been made

in Germany of the reactions of *Lymantria monacha* and *Pristiphora abietina* to Spruce given various fertilizer treatments. Ca, N and P increased mortality compared with controls, whereas K and Mn + Br decreased it. In *L. monacha* the sex balance also was disturbed [*F.A.* 18 No. 1851].

Prediction of outbreaks. A more extensive study of air-mass climatology when investigating fluctuations of insect populations has been urged by Wellington [*F.A.* 16 No. 3171], who illustrates his thesis by demonstrating an association between outbreaks of *Malacosoma disstria* in Canada and increasingly frequent invasions of an area by southern and south-western cyclonic centres. He maintains that observation of atmospheric circulation processes can sometimes produce more trustworthy forecasts of insect activity than those based on variations in sunspots or ultra-violet radiation.

In Serbia, experiments have shown the possibility of diagnosing the state of outbreaks of *Lymantria dispar* by exposing traps containing the female scent (extracted in the laboratory) and thereby attracting males [*F.A.* 16 No. 698; 17 No. 3044].

Biological control. An outstanding example of the possibilities of pest control by biological means is offered by the present status of the Eucalyptus snout beetle (*Gonipterus scutellatus*) in S. Africa, where the mymarid egg parasite *Anaphoidea nitens*, first imported in 1926, has now been introduced on a subcontinental scale. Earliest control was obtained in the S. and S.W. Cape, where the climate resembles that of S.E. Australia. In summer-rainfall regions, owing to modifications in the normal (Australian) life cycle of the beetle, economic control on all Eucalypt species took 3–5 years (areas below 4000 ft.) and sometimes 5–15 years (areas above that altitude). Elsewhere the balance, although still delicately poised, appeared by 1955 to be swinging over to the credit side [*F.A.* 16 No. 4333]. In Germany, in another field of biological control, Wellenstein discovered that populous nests of *Formica rufa* can prevent defoliation by *Diprion pini* larvae within a radius of ca. 15–25 m. [*F.A.* 17 No. 4246]; damage to trees by the coccids and aphids (e.g. *Lachnus pineti*) fostered by the ants is, Wellenstein maintains, rarely serious [*F.A.* 18 No. 626], a view not supported by Müller's studies of the effects of *Lachnus bogdanowi* on 4-year-old Spruce [*F.A.* 18 No. 4304].

Chemical control. Oily contact insecticides developed since 1945 have proved very efficient in the control of *Hylotrupes bajulus*. More important than high toxicity or depth of penetration is the oil's capacity to penetrate via the frass into the tunnels [*F.A.* 16 No. 2385]. In Canada it was found that spraying Douglas Fir timber one week after attack with an emulsion containing 0·4% lindane and 5% $C_2H_4Br_2$ arrested the development of beetles in the wood and prevented subsequent attacks. The method is recommended against attacks on freshly sawn timber of high value [*F.A.* 17 No. 2156].

Against termites, experiments are in progress in the U.S.A. at the Gulfport Forest Insect Laboratory to test a wide variety of soil poisons [*F.A.* 17 No. 2160]. A new fumigant, sulfuryl fluoride, manufactured by the Dow Chemical Co. for use in the control of the dry-wood termite *Kalotermes minor* has certain of the advantages of MeBr, viz. non-inflammability, penetration, ease of application and lack of malodorous reaction [*F.A.* 18 No. 3465]. In Germany, Schmidt has devised experimental methods for testing natural wood, plywood, chipboard and fibreboard for termite resistance [*F.A.* 18 No. 1077].

Control by radiation. In the U.K. the first results were reported in 1955–56 of experiments in the use of γ-rays for killing, inhibiting fertility and affecting the development of *Lyctus brunneus*, *Xestobium rufovillosum* and *Anobium punctatum* [*F.A.* 18 No. 1075]. Although the method is not likely to be practical for the eradication of insects, according to Bletchly and Fisher [*F.A.* 18 Nos. 1076, 3461] lower dosages can sterilize and arrest the development of adults. It is interesting in this context to note some unexpected results obtained by Bergold in Canada. In silkworm larvae injected with a polyhedral virus suspended in C^{14}-labelled alanine and glycine, the β-radiation unexpectedly inhibited virus multiplication and ca. 40% of the silkworms overcame the virus infection [*F.A.* 16 No. 678].

Detection of borers. In the U.S.A. a high-gain, low-noise, frequency-selective amplifier has been designed that is receptive to the foot-fall of a single dry-wood termite. A highly sensitive pick-up bears a needle-like probe that can be pushed into any wood surface, leaving a scarcely noticeable hole [*F.A.* 17 No. 2150]. In Germany an instrument invented by Dr. E. Gieseking of the Arbeitskreis Osmose-Bauholzschutz will detect the presence of *Hylotrupes bajulus* by making audible the sound of larvae feeding [*F.A.* 16 Nos. 1137–8].

SURVEYING

Ground surveys. An invention of the greatest interest is the Tellurometer, an instrument for microwave measurement of distances, developed in South Africa [*F.A.* 18 p. 585]. It operates on the 10-cm. wavelength region and measures the transit of radio waves over the length to be determined, with an accuracy of a fraction of a millimicrosecond. Measurements can be made by day or night, and visibility is immaterial. The range is 100 ft. to 100 miles, but the maximum for practical working is ca.

35 miles. The instrument was developed primarily for geodetic purposes but its lightness and simplicity of operation are such that it may well be useful in applications in which the full accuracy of the instrument is unnecessary, such as controlling the scale of aerial photography or for mapping purposes in general. In the latter case it may be particularly useful where it is difficult or unnecessary to carry through a chain of triangulation. The Tellurometer is claimed to be the most important development in surveying since the invention of the theodolite. An account by the inventor, T. L. Wadley, will be found in *Empire Survey Review* 14 (105–6), 1957 (100–11, 146–60).

Surveys combining air and ground work. A method, developed in Canada and used successfully in Quebec, Newfoundland, Nova Scotia, and Yukon [*F.A.* 17 No. 696] is based, in the first place, on the classification or 'stratification' of forest stands by the aerial-photo interpreter. Stands are classified by 20-ft. height classes, type (proportion of hardwoods), canopy-density classes, and topography (5 classes), and these are demarcated on a provisional map, using appropriate symbols. The map is next taken into the field, and random sample plots are measured in sufficient numbers to provide adequate samples of each category (stratum). The plot data are computed and used to correct the original photo-interpretation where necessary; a final map is then drawn, map areas are planimetered, and timber estimates prepared. The method avoids subjective alterations, in field or office, of the original aerial-photo classification. It has been adapted for use in other regions, notably Cyprus [*F.A.* 19 No. 781], Uganda [*F.A.* 19 No. 824], and Australia [*F.A.* 16 Nos. 4384–5]. In Cyprus the categories used for 'stratification' are species composition, height of trees, density of stocking, and site quality; in Uganda, topography and broad forest types; in Australia, broad forest types, stand-development categories (regeneration, saplings, poles, mature, overmature), height of dominants, and density of stocking. In New Zealand, where the national forest survey was based on aerial photos, but without random stratified sampling, various methods of determining areas on maps were tried (planimetering, dot grid, intercepts, and weighing map cut-outs). The last of these was by far the most satisfactory for determining large numbers of areas of irregular shape [*F.A.* 18 No. 4459].

In the Prüm district of the Rhineland, which includes 20,000–25,000 ha. of small scattered private forests, the area of 4 main categories of land use—waste land, understocked woodland, coppice, and high forest—was determined through the line-intercept method, using squares instead of a continuous line. Aerial photographs (scale 1/10,000) were gridded in 1-km. squares, and every 4th grid square was marked off. The categories were delimited round the sides of the square and measured, and the area of each calculated on the assumption that length was proportional to area. A ground check showed a standard error of $\pm$ 6%. This method of sampling is particularly useful for such regions, where full inventories would be too costly [*F.A.* 18 No. 1996].

To be concluded.

ABSTRACT SECTION

0. FORESTS, FORESTRY, AND THE UTILIZATION OF FOREST PRODUCTS: GENERAL

For general *regional* accounts see section 90

Translations

See Nos. 900, 981, 993–4, 1123.

0 (048.1). Bibliographical Lists

See Nos. 12–3, 122, 129, 462, 520, 574, 825, 1095, 1178.

0 (05). Periodicals. Yearbooks. Directories. Almanacs, Calendars, Diaries

See also Nos. 5, 866.

1. ***Mitteilungen des Vereins für forstliche Standortskunde und Forstpflanzenzüchtung.*** Eugen Ulmer, Stuttgart.

Previously *Mitteilungen des Vereins für forstliche Standortskartierung* [see *F.A.* 14 No. 3605]. No. 6 under the new title was issued in Aug., 1957. Citation in *F.A.: Mitt. Ver. forstl. Standortskunde ForstpflZücht.*

2. ***Holzforschung und Holzverwertung.*** Österreichische Gesellschaft für Holzforschung. Wien. Bi-monthly. Annual subscription *Sch.* 60; single copy *Sch.* 12 (plus postage). P.R.

Appears from 1.1.1957, with Vol. 9 No. 1, in continuation of *Mitt. öst. Ges. Holzforsch.* Citation in *F.A.: Holzforsch. u. Holzverwert., Wien.*

3. **The Empire Forestry Handbook 1957.** Empire Forestry Association, London. 7th ed. (rev.) 1957. pp. 144. Price 20*s*.

The arrangement is much the same as in the last edition (1952).

0 (084.3/.4). Maps. Atlases

4. Atlas du Maroc No. 19a. Forêts. Feuilles NO, NE, SO, SE. **[Atlas of Morocco. No. 19a. Forests. Sheets N.W., N.E., S.W., S.E.]** Institut Scientifique Chérifien, Rabat. 1957. 4 sheets. [F.] Scale 1 : 1,000,000.

Sheet S.E. also contains a map showing the forest economy of Morocco, scale 1 : 2,000,000.

0 - - 011. Terminology. Nomenclature

See Nos. 29, 121, 130.

0 - - 014. Classification

See also No. 1245.

5. HALL, N. **The Oxford System of Decimal Classification for Forestry.** *Aust. For.* 20 (2), 1956 (63–88).

A general account of the system and its application, and a classified index, based on the O.D.C., to Vols. 1–20 of *Australian Forestry.*

0 - - 015. Mathematical and Statistical Methods

6. JOBLING, J. **Statistical methods in experiments.** [*Docum.*] *13th Sess. stand. exec. Comm. int. Poplar Comm., Paris 1957* No. *FAO/CIP/CP*/11, 1957. pp. 16. Limited distribution.

A report summarizing replies to a questionnaire [cf. *F.A.* 18 No. 332] and discussing recommendations of a Working Party of I.U.F.R.O., with an annexe giving a system of symbols (letters and figures) to designate the nature, nursery treatment, and age of Poplar plants, proposed by *E. Allegri.*

7. RAGHAVAN, M. S. **Technique adopted and proposed in the Andhra State in silvicultural research.** [Forest Department, Andhra State.] 1957. pp. 16. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

Deals mainly with lay-out of experiments and statistical analysis of data.

8. DAWKINS, H. C. **Some latin square and randomized block experiments in tropical high-forest.** Uganda Forest Department, Entebbe. 1957. pp. 7. 4 refs. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

Describes methods used in the assessment of the effectiveness of different silvicultural treatments of high forest in Uganda (regeneration methods and weeding, release, thinning, pruning etc.).

1. FACTORS OF THE ENVIRONMENT. BIOLOGY

11. Site Factors: Climate, Situation, Soil, Hydrology (Water Conservation, Soil Conservation and Erosion)

111. The Atmosphere. Meteorology. Climate and Microclimate

111.7. Humidity, Evaporation. Clouds etc. Precipitation

See also Nos. 19, 83.

9. SOLOMON, M. E. **Estimation of humidity with cobalt thiocyanate papers and permanent colour standards.** *Bull. ent. Res.* 48 (3), 1957 (489–506 + 4 photos). 21 refs.

Both are now in commercial production; the method and applications are detailed, and the errors statistically examined. The method was developed in Japan for determining forest fire danger [see *F.A.* 18 No. 1749] but the applications considered here are chiefly for humidities in small inaccessible spaces, e.g. under bark, or in stored seed.

111.8. Climatology. Climate and Microclimate

See also Nos. 167, 309, 383, 806–9.

10. BAUMGARTNER, A. Beobachtungswerte und weitere Studien zum Wärme- und Wasserhaushalt eines jungen Waldes. **[Observational data and further**

studies on temperature and water balances in a young forest stand.] *Wissenschaftliche Mitteilungen, Meteorologisches Institut, Universität München* No. 4, 1957. pp. 59. 13 refs. [G.] X.

Gives tables of the original material used in a report already published [see *F.A.* 18 No. 3630] with a few additional observations on differences in radiation between forest and meadow, and the horizontal distribution of dew in a clear-felled area.

11. KRISHNASWAMY, V. S., DABRAL, S. N., and NATH, P. **Forest influences: study of soil temperatures and humidity in the New Forest, F.R.I. Dehra Dun. Part I.** *Indian For.* 83 (7), 1957 (416–50 + 10 gphs.). 7 refs.

[Cf. *F.A.* 18 No. 2406.] A study of soil temperature and moisture was started in 1953 in order to determine the effects of afforestation. Comparative data from (*a*) the interior of plantations and (*b*) a bare surface in the open, are tabulated and discussed, and preliminary conclusions drawn. Morning temperatures were always lower in (*a*) than in (*b*). Among the (*a*) sites, summer temperatures were highest and winter ones lowest under Chir (*Pinus longifolia*), and summer temperatures lowest and winter ones highest under *Casuarina equisetifolia*. Diurnal fluctuations were significantly greater, and infiltration more rapid, on (*b*) than in (*a*). Air temperatures at ground level and 5 ft. above it were higher in (*a*) than on (*b*) during winter nights.

114. Soil. Soil Science

12. PLAISANCE, G. Bibliographie des sols forestiers (répertoire international). **[Bibliography of forest soils (international list).]** The Author, 14 rue du Collège, Dôle (Jura). 1957. pp. 165. [F.] (*Annales du Centre d'Études et de Documentation Paléontologiques* No. 25.) Price *Fr.*800.

Comprises over 2200 titles, arranged under authors, with subject and geographical indexes, and a list of bibliographies.

13. PLAISANCE, G. Bibliographie des sols de France. **[Bibliography of French soils.]** The Author, 14 rue du Collège, Dôle (Jura). 1957. pp. 245. [F.] (*Annales du Centre d'Études et de Documentation Paléontologiques* No. 21.) Price *Fr.*1000.

Contains over 3300 titles arranged under authors, with geographical and subject indexes and a list of bibliographies.

114.1 Soil Physics

See also Nos. 11, 24–6, 32, 383, 533, 551.

14. ČERNIKOV, F. S. Vodoobespečennost' drevesnyh nasaždenij na svetlokaštanovyh počvah Ergenej. **[The water supply of tree stands on the light-chestnut soils of the Ergeni Hills.]** *Počvoved.* 1957 (3), (48–57). 17 refs. [Russ.e.] A.P.B.

The soil-water regime under a stand predominantly of Oak in the Rostov province was studied from establishment in 1932 to 1955. Data on the water requirements of the stand and the amount of water in the soil are tabulated for 12 years. The author concludes that the poor growth is a result of serious water deficiency in the second half of the growing season. Recommendations include simple measures for regulating the run-off from snow-melt; a reduction in stand density; use of quick-growing species; deep ploughing before planting; periodical root pruning, and application of N and P fertilizers.

15. MASHIMO, Y. **[Studies on the water of forest soils (III). Permeability of the dry brown forest soils.]** *J. Jap. For. Soc.* 38 (10), 1956 (389–93). 8 refs. [Jap.jap.e.*e.*]

Results of measurements of permeability, structure and fertility are shown in graphs and tables.

16. DEINES, G. Versuch zur Kennzeichnung des nutzbaren Wassers forstlicher Standorte. **[An attempt to determine the available water of forest sites.]** *Forstarchiv* 28 (8/9), 1957 (164–70). 8 refs. [G.g.]

Details are given of a method based on the determination of the clay content of a soil and its moisture equivalent.

17. FRASER, D. A. **Ecological studies of forest trees at Chalk River, Ontario, Canada. III. Annual and seasonal march of soil moisture under a hardwood stand.** *Tech. Note For. Br. Can.* No. 55, 1957. pp. 25. 22 refs.

Data were drawn from the same plots as other studies in this series [cf. *F.A.* 18 No. 1395], and changes in soil moisture were recorded during the period 1949–54 and correlated with precipitation and potential evapo-transpiration for the same period. The data are presented and discussed in detail.

18. FRASER, D. A. **Ecological studies of forest trees at Chalk River, Ontario, Canada. IV. Annual and seasonal march of soil temperature on several sites under a hardwood stand.** *Tech. Note For. Br. Can.* No. 56, 1957. pp. 15. 22 refs.

Soil temperature data from the 2-, 3-, 12-, 36-, and 108-in. depths on three sites under a hardwood stand on the Petawawa Forest Experiment Station are compared with air temperatures at the 4-foot level for the 1949–56 period. Temperature differences between the sites were greatest in the spring and amounted to as much as 14° in the upper foot of soil. The maximum soil temperature at the 2-in. depth on the dry sites was 73° F. in the hot dry summer of 1955. During the cold wet summer of 1954 this maximum was about 10° lower. Frost penetration was usually limited to the upper 2–3 in. of soil, since the winter snow cover formed an insulating layer. Maximum and minimum temperatures at the 108-in. depth were 50° and 38° F. respectively. *From author's summary.*

114.2. Soil Chemistry

See also Nos. 24, 27–8, 42–3, 73, 416, 551.

19. HESSE, P. R. **Studies on sulphur metabolism in soils and muds.** *Rep. E. Afr. Agric. For. Res. Organ. 1955/56*, [1957] (22–8).

Apart from gradual oxidation of organic S to sulphate in the topsoils of forests, an additional cycle has been found in which sulphate is leached directly from the vegetation. The fresh leaves of the forest

trees contain appreciable quantities of sulphate (30–300 p.p.m. SO_4-S dry wt.) and analyses of rainwater have shown that the rain falling on the soil under forest cover contains more sulphate than does that falling on adjacent open land. Using the respirometer technique, an investigation has been made into the rate of production of sulphate from the organic matter in forest topsoils. This has proved to be a very slow process; for example, only 5 p.p.m. SO_4-S were produced from Wattle forest topsoil kept at 30° C. under ideal conditions of moisture and aeration for 6 months, in spite of a high (350 p.p.m.) organic-S content.

20. HOLSTENER-JØRGENSEN, H. Danske skov- og plantagejorders mineralogiske sammensætning. **[The mineral composition of Danish forest and plantation soils.]** *Medd. norske Skogforsøksv.* 14 (No. 48), 1957 (201–13). 5 refs. [Dan.e.]

The base mineral index (b.m.i.) of Danish forest soils proved to be low (0·2–5·5%) compared with that for Sweden (average 10%). No relation was found between b.m.i. and site class, presumably because of such other limiting factors as low content of N or water. There was a clear correlation between available K and b.m.i. in soils with a clay content of 0–6% and a less clear one for higher clay contents. There was a possible relation between available P and b.m.i.

114.3. Soil Formation. The Soil Profile and its Development. Litter, Humus etc.

See also Nos. 73, 268, 415–6, 551.

21. BIRD, E. C. F. **The use of the soil catena concept in the study of the ecology of the Wormley Woods, Hertfordshire.** *J. Ecol.* 45 (2), 1957 (465–9). 5 refs.

Study of the vegetation in relation to the soil catena was found particularly useful in determining areas of ecological interest for possible inclusion in a nature reserve. The Wormley Woods are essentially Sessile Oak/Hornbeam with well marked variations in the composition and structure of the tree, shrub and ground layers, the composition being related to the soil catena. The structure of the woodland vegetation, on the other hand, shows little relation to the soil catena. Measurement of soil acidity in the uppermost 6 in. of soil along traverses from coppiced woodland into high-forest areas on the valley side showed a sharp lowering of pH values to $< 3{\cdot}5$ beneath bracken. Evidently the advanced podzolization and blackening of soils in these areas indicates that conversion of coppiced woodland to high forest has resulted in deterioration of base status in the soils. No such deterioration was found beneath the bramble society developed in the high forest on the spur-crest sites.

22. JAHN, R. Forstliche Standortskartierung im Buntsandstein—Hochschwarzwald (Hornisgrindegebiet). **[Forest site mapping in the bunter sandstone region of the high Schwarzwald (Hornisgrinde area).]** *Mitt. Ver. forstl. Standortskunde ForstpflZücht.* No. 6, 1957 (39–55 + 10 plates). 10 refs. [G.]

A description, illustrated by a detailed site map of part of the area, of 10,000 ha. of state forest, with special reference to soil formation as related to parent materials, topography, and vegetation. The author discusses the fact that on some old podzols, which were probably formed before the Beech/Silver Fir period, podzolization has stopped, and on others under century-old Beech/Silver Fir forests the process has even been reversed. He also observed that raw-humus layers were generally less heavy than reported in the literature of ca. 50–60 years ago. This reduction of the raw humus, which is considered to be an effect of climatic fluctuations, was observed in stands of varying ages and density, including an unexploited nature reserve near the Wildsee where the old humus level could still be seen on roots and butts. The improvement in soil fertility caused by this breakdown of the raw-humus layers was also confirmed by the resumption of height growth in middle-aged Pines whose crowns had rounded off.

23. MANCINI, F. Contributo alla geopedologia della macchia di Migliarino (Pisa). **[Soil development in the wood of Migliarino (Pisa).]** *Ann. Accad. ital. Sci. for.* 5, 1956 (301–31 + 3 photos). 37 refs. [It.f.]

A study was made of a number of profiles under *Pinus pinea*, mixed hardwoods and *Pinus pinea*/*Quercus ilex* with different ground vegetation on soils originating in sand dunes. Pure Pine stands tend to form raw humus and to lead to podzolization, and mixture with *Q. robur* and *Q. ilex* is recommended.

24. POHITON, P. P. Vlijanie drevesnyh i kustarnikovyh porod na fisiko-himičeskie svojstva černozemnoj počvy. **[The influence of tree and shrub species on the physical and chemical properties of a chernozem soil.]** *Počvoved.* 1957 (3), (40–7). 8 refs. [Russ.e.] A.P.B.

In the Trostyanets park, Ukraine, soil analyses were made to 50 cm. depth under groups of 30 tree and shrub species. Tabulated data show the humus accumulation, pH of the water extract (measured electrometrically), hydrolytic acidity and adsorbed bases of the soil under each species; two control plots were established on fallow land. The humus content was higher under trees than on the controls but the amounts varied considerably with species. Under conifers the pH increased gradually to a depth of 20–30 cm.; between 30 and 50 cm. it rose sharply, reaching neutral. Under broadleaved species a sharp increase in the pH was noted between 10 and 20 cm. The content of adsorbed bases in the soil varied; it increased where humus content and pH were high, and decreased with increasing hydrolytic acidity. The author recommends, for afforestation of leached chernozems with little humus, the broad-leaved species: *Fraxinus excelsior*, *Juglans nigra*, *J. cinerea*, *Tilia cordata*, *Acer platanoides*, *Betula verrucosa*, *Gleditsia triacanthos*, *Ulmus laevis*, *Quercus robur*, *A. pseudoplatanus*, and the conifers: *Thuja accidentalis*, *Larix decidua*, *Abies alba*, and *Pinus strobus*. On ordinary chernozems the soil-acidifying species recommended are: *Rhus cotinus*, *Juniperus* spp., *Pinus sylvestris*, *P. nigra* var. *caramanica* and *Picea abies*.

25. MUSTAFAEV, H. M. Izmenenie počvy pod lesnymi polosami različnogo sostava. **[Soil changes under anti-erosion belts of different composition.]** *Počvoved.* 1957 (1), (107–10). [Russ.e.] A.P.B.

Soil structure analyses to a depth of 60 cm. were made in the Kuibyshev region in 1954 on ordinary clay-loam chernozem under 16-year plantations of (*a*) predominantly Oak (*Quercus robur*) in mixture with Ash (*Fraxinus excelsior*), (*b*) Siberian Larch in mixture with Oak and Ash and (*c*) Scots Pine in mixture with *Ulmus pumila* var. *arborea*. The content of water-stable aggregates > 1 mm. between 2 and 12 cm. depth (A horizon) was (*a*) 47·1, (*b*) 28·1 and (*c*) 25·1%. The bulk density of this horizon was (*a*) 0·88, (*b*) 1·03 and (*c*) 1·07, and correspondingly porosity was highest under (*a*) and lowest under (*c*). There were no significant differences in sp. gr. The infiltration capacity under (*a*) was ca. 4 times that under (*c*) and twice that under (*b*). Experimental litter removal in (*a*) caused a great reduction in infiltration capacity. It is concluded that under these conditions of soil and climate, anti-erosion belts should consist of Oak in mixture with Ash and Maple.

26. MALJANOV, A. P., and SARALIDZE, T. V. Vlijanie lesnyh polos na strukturu temnokaštanovoj počvy Zavolž'ja. **[The influence of shelterbelts on the structure of the dark-chestnut soil of the Trans-Volga region.]** *Počvoved.* 1957 (3), (33–9). 11 refs. [Russ.e.] A.P.B.

Studies were made near Saratov on soil structure in the top 20 cm. under 14- to16-year belts (consisting of 5 strips, the outer two consisting of a double row of *Elaeagnus angustifolia*, and the remainder, each of 5 rows, being a mixture of *E. angustifolia*, *Caragana arborescens*, *Ulmus pumila* var. *arborea* and *Acer* sp.), and under adjacent plots, at distances up to 750 m., of *Agropyron* sp., 2-year-old fallow, and fields of oats and pumpkins. Data are tabulated on water reserves and humus content of the soil, and on the water-stability of the soil aggregates under the different types of cover. The influence of the shelterbelts on the soil extended to a distance of 100 m.; within this area the soil had better structure and the water-stability of the aggregates was improved. This influence was more perceptible under grasses than under annual crops.

27. BONNEVIE-SVENDSEN, C., and GJEMS, O. **Amount and chemical composition of the litter from Larch, Beech, Norway Spruce and Scots Pine stands and its effect on the soil.** *Medd. norske Skogforsøksv.* 14 (No. 48), 1957 (111–75). 54 refs. [E.e.nor.]

Investigations were made in 1948–49 and 1951–53 on *Larix decidua*, *L. sibirica*, *L. leptolepis* and *Fagus sylvatica* and, for comparison, *Picea abies* and *Pinus sylvestris* in neighbouring stands. Litter is divided into (1) main litter (needles and leaves of the main tree species); (2) residual litter (all other litter from the main tree species); (3) other litter. The litter fall varied considerably from year to year, but was clearly related to stand density, expressed as b.a. (1) usually amounted to > 70% of the total. Total litter under Norway Spruce is 1·7–3·8 times the annual litter fall compared with 1·3–1·9 times for Larch, and still lower figures for Scots Pine and Beech. The elementary analysis of the litter varies between plots and from year to year. Larch needles are poorer in Ca, and usually in Mn, than Norway Spruce, but richer in Mg, and the ash from Larch needles is higher in Si. Scots Pine needles are poorer in ash, and the contents of Mg, K, P and Si are lower than in Larch. Beech leaves are poorer in K, P and N than Norway Spruce needles but richer in Mg. Larch needles were poorer in all elements and had a lower ash content than Beech leaves from the same site. No connexion was found between the chemical condition of the soil, except in the humus layer, and the litter constituents: (2) and (3) showed greater variation in chemical composition than (1) and were poorer in nutrients. Large quantities of N, Ca, and Si, calculated on the basis of the litter fall and the nutrient content of the litter, are returned to the soil annually. (3) formed only a small part of the total litter but had a high nutrient content; it was present in greater quantity under Larch than under Spruce and under Spruce than under Beech.

28. MILLER, R. B., and HURST, F. B. **The quantity and nutrient content of Hard Beech litter.** *For. Res. Notes N.Z. For. Serv.* No. 8, 1957. pp. 14. 10 refs.

The monthly litter fall has been measured over a 4-year period in a Hard Beech (*Nothofagus truncata*) stand near Wellington. Eight trays were adequate for measuring annual litter production, but 4 years were insufficient to get a reliable mean annual value. There were distinct peaks in leaf-fall in early summer, the leaves dropped being those formed the previous spring. The 4 years covered two flowering cycles and the low leaf-falls in 1953 and 1955 and high leaf-falls in 1952 and 1954 were directly related to flowering in 1952 and 1954. The chemical composition of the litter commonly varied by 30% from month to month, but the mean values from year to year corresponded fairly closely. Compared with the twigs, the leaves were relatively high in N, P, and K, and low in Ca. The minimum addition of plant nutrients to the soil by the litter in lb./acre/year averaged—Ca 55; Mg 8; K 6; P (as P_2O_5), 4 and N 33. To arrive at totals it would be necessary to include the nutrients leached by the rainwater from the litter in the trays. The implications for litter sampling were considered and it is recommended that fresh samples be taken from as wide an area as practicable and that samples be taken at several different times of the year. *Authors' summary.*

29. EHWALD, E. Über einige Probleme der forstlichen Humusforschung, insbesondere die Entstehung und die Einteilung der Waldhumusformen. **[Some problems of forest humus research, particularly the genesis and classification of forest humus forms.]** *S.B. dtsch. Akad. LandwWiss. Berlin* 5 (12), 1956. pp. 44. 87 refs. [G.]

A review of German and foreign literature including a revised proposal for the classification of humus forms and a discussion of terminology.

30. HOUBA, A. Vliv genese půd na vzrůstové poměry lesů plzeňské pánve. **[Effect of soil genesis on the growth conditions of forests in the Plzeň [Pilsen] valley.]** *Práce výzkum. Úst. lesn. ČSR* No. 6, 1954 (225–81 + 6 tbls.). 57 refs. [Cz.cz.russ.g.]

Presents the results of an investigation (1949–52) carried out in the N. part of the Plzeň valley (hilly region, alt. 300–500 m., Lange rain factor 50–70). The soils are grouped primarily by parent materials (Algonkian bedrock, Pleistocene and Holocene, Permo-carboniferous, granite, and Tertiary). The different soil types of these 5 groups are discussed in detail (profile, chemistry, morphology, moisture, pH), and the tree vegetation is listed for each.

114.4. Soil Classification. Soil Types

See also Nos. 21–6, 30, 42–3, 228, 1233.

31. OLIVEIRA, J. A. LINCE DE. Solos florestais de Portugal. I. Primeira parte: Introdução ao seu estudo; divulgação de alguns aspectos. As cartas de solos de Portugal. **[Forest soils of Portugal. I. First part. Introduction; exposition of some points of view. The soil maps of Portugal.]** *Estud. Inform. Serv. flor. aqüíc. Portugal* No. 76–*B*3, 1957. pp. 68. [Port.] Limited distribution.

Reviews the soil map of Portugal published in 1937 by E. H. del Villar, and discusses Del Villar's classification, that of the Estação Agronómica Nacional and the soil map of Teles Grilo.

32. ESCHNER, A. R., JONES, B. O., and MOYLE, R. C. **Physical properties of 134 soils in six North-eastern states.** *Sta. Pap. Ntheast. For. Exp. Sta.* No. 89, 1957. pp. 11 + 12 pp. of tbls. 7 refs.

114.5. Soil Fertility. Soil Toxicity. Soil Depletion and Exhaustion

See also Nos. 15, 20, 22, 204, 210–2, 228, 245, 268, 535–6, 793–8.

33. WALLACE, T. [Editor]. **Plant analysis and fertilizer problems.** Institut de Recherches pour les Huiles et Oléagineux, Paris. 1957. pp. 410. Many refs. Price *Fr.*2000.

Papers read at a colloquium held in Paris in 1956. Those of special forestry interest are noticed separately in this issue of *F.A.* Papers are written in English, French, or German.

34. LEYTON, L. **The diagnosis of mineral deficiencies in forest crops.** Forestry Commission, London 1957. pp. 6. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

The merits and demerits of the various techniques available for the investigation of mineral deficiencies are discussed, with particular reference to foliar diagnosis and the problems raised by interactions between nutrients. More than one technique will probably be needed for the complete investigation of any problem; but ultimate proof of extra yield by fertilizing depends on actual trials in the field. *Author's summary.*

35. LEYTON, L. **Needle composition in relation to the growth and nutrition of Japanese Larch.** In *Plant analysis and fertilizer problems*, Institut de Recherches pour les Huiles et Oléagineux, Paris. 1957. pp. 143–9. 6 refs. [E.]

Further analyses of the data [cf. *F.A.* 17 No. 2541] are reported and discussed. There is a high degree of correlation between the N concentration and the N/P ratio in the needles, and this, combined with the markedly depressing effect of N supply on the P status of the needles, raises further problems concerning the P nutrition of the trees. At the higher levels of N supply, the P concentration in the needles falls to a level at which it may itself be limiting growth.

36. TAMM, C. O. **The effects of nitrogen fertilization on tree growth and foliage composition in a forest stand.** In *Plant analysis and fertilizer problems*, Institut de Recherches pour les Huiles et Oléagineux, Paris. 1957. pp. 150–7. 7 refs. [E.]

The present paper deals with some effects of application of NH_4NO_3 to a forest stand deficient in N, and particularly with changes in foliage contents of other nutrients (P, K, and Ca) due to the treatment. Most of the experimental data have already been published [see *F.A.* 18 No. 1596].

37. OPPENHEIMER, H. R. **The influence of the soil on the development and the mineral composition of the Aleppo Pine.** In *Plant analysis and fertilizer problems*, Institut de Recherches pour les Huiles et Oléagineux, Paris. 1957. pp. 272–80. 14 refs. [E.] Also in *La-Yaaran* 7 (3/4), 1957 (5–9, 40). [Heb.e.]

Aleppo Pine seedlings grown under nursery conditions, in containers filled with different soils, developed normally in all except dune sand. In soft, powdery limestone with 86·5% CO_3, development in the second year was excellent, after some delay in the first year. Needle analysis of healthy seedlings gave the following results (in % of dry weight): K 0·27–0·54; Ca 0·30–0·90; Mg 0·13–0·20; P 0·064–0·147. These figures are similar to those established by other workers for *Pinus nigra* and *P. sylvestris*, and fluctuations produced by soil differences are surprisingly small. The small variation in K, in spite of very large differences in soil Ca, is specially remarkable. A survey of needle composition in young and mature plantations gave similar results. It is finally concluded that Aleppo Pine is a limestone-tolerant rather than a calciphilous species. *From author's summary.*

38. BEAUFILS, E. R. Recherches sur la variation des constituents minéraux dans les feuilles et le latex de l'*Hevea brasiliensis*. **[The variation of mineral constituents in the leaves and latex of *H. brasiliensis*.]** *Revue Générale du Caoutchouc, Paris* 32 (4), 1955 (323–31). 12 refs. [F.E.f.e.g.span.it.] E.M.B.

Measurements were made on samples from a number of plots used for clonal or fertilizer trials. Variations in mineral elements in the leaves were generally interrelated. While absolute values varied, the leaf N/K and K/P ratios were more or less constant and unaffected by plant origin, soil, season, age, or management methods; in cases of nutrient deficiency, however, the ratios varied considerably from the norm. Latex K/P was about the same as leaf K/P, but latex N/K was less than half leaf N/K. In cases of K deficiency, leaf K/P diminishes and

latex K/P increases till the latter is twice the value of the former. Another relation established was that a lower leaf K/Ca ratio corresponds to an increased Mg content in the latex. N, P, K, Cu and Fe in leaves, and N, P, K, and Cu in latex, are related to moisture content. Ca, Mg, Mn, and Na apparently vary inversely with N, P, K, Cu, and Fe.

39. BEAUFILS, E. R. Recherche d'une exploitation rationnelle de l'Hévéa d'après un diagnostic physiologique reposant sur l'analyse minérale de diverses parties de la plante. **[Rational management of *Hevea* according to a physiological diagnosis based on mineral analysis of different parts of the plant.]** In *Plant analysis and fertilizer problems*, Institut de Recherches pour les Huiles et Oléagineux, Paris. 1957. pp. 360–76. 16 refs. [F.]

As a result of a large number of analyses of leaves, fruit and latex, it is now possible to diagnose the nutrient status of Rubber from foliar analysis with considerable accuracy, and this is now a routine process in Rubber plantations in Indo-China. The possibility of applying the technique to other tree plantations in the tropics is discussed.

40. BROESHART, H. **Some aspects of mineral deficiencies and the chemical composition of Oil Palms.** In *Plant analysis and fertilizer problems*, Institut de Recherches pour les Huiles et Oléagineux, Paris. 1957. pp. 377–83. 4 refs.

Results of these and other studies show that there is a 'normal' leaf composition for *Elaeis guineensis*: (in % of dry weight) K 1·7–1·9; Ca 0·55–0·65; Mg 0·25–0·35; and P 0·21–0·23. It is not dependent on soil type and is identical for old and young plants. Tabulated deviations from this norm for two stages of nutrient deficiency are given.

41. RENNIE, P. J. Les prélèvements des éléments nutritifs des forêts exploitées et leur importance sur les sols pauvres pour la production de bois. **[The nutrient drain from exploited forests, and its importance for the production of timber on poor soils.]** *Rev. for. franç.* 9 (7), 1957 (529–45). 24 refs. [F.e.]

[Cf. *F.A.* 17 No. 2540.] Estimates are presented for the quantities of the major nutrients Ca, K and P, taken up during 100 years by one ha. of forest. These quantities are larger for timber forest than for unexploited virgin forest, because nutrients are continuously removed in timber crops. This removal of nutrients increases in the order P—K—Ca, and in the order 'Pines'—'other conifers'—'hardwoods'. It is greater for a faster growth rate, and becomes negligible only when no timber is being produced. Good-quality forest soils appear well able to replace these nutrient removals, but many highly siliceous soils, which in many countries today are being increasingly expected to support timber forest, cannot effect this replacement because their mineral reserves are too small. On such soils permanent productive timber forest can only be assured by the development of new silvicultural methods, which, as in agriculture, utilize suitable fertilizer materials. *From author's summary.*

42. MINA, V. N. Materialy k izučeniju proizvoditel'nosti temnoseryh lesnyh počv dubovyh lesov. **[Research on the fertility of dark-grey forest soils under Oak forest.]** *Soobšč. Inst. Les.* No. 3, 1954 (5–9). 1 ref. [Russ.]

Preliminary report on analyses, to 30 cm. depth, of these soils of the Tellerman Forest, under 4 Oak/Ash stands 22 to 220 years old. Data are tabulated on pH, contents of humus, N and exchangeable bases, and the production of organic matter represented by the woody and herbaceous vegetation itself. Concludes that the long-continued existence of these forests has maintained soil fertility.

43. KUNDLER, P. Beurteilung forstlich genutzter Sandböden im nordostdeutschen Tiefland. **[The appraisal of the sandy soils used for forestry in the N.E. German plain.]** *Arch. Forstw.* 5 (9/10), 1956 (585–672 + 12 photos). 81 refs. [G.g.]

Silicate content (*a*), particle size distribution (*b*) and local climate (*c*) chiefly determine the productivity of these sands. Soil types, forest associations and their site quality are explained by various combinations of the 3 factors. As the age of the glacial sand deposits increases, (*a*) decreases, e.g. the sands of the outwash ('*Sander*') and of the moraines are generally richer, and the valley and dune sands poorer in (*a*). Medium and medium-fine sands are generally the poorest, and coarse and fine sands richer in (*a*). The distribution of (*a*) over the various fraction classes of (*b*) is generally regular and is determined by weathering processes. Both (*a*) and (*b*) vary regularly under weathering. A strong linear correlation exists between (*a*) and the K and Ca available on weathering, particle size here playing a subordinate role. Rapid methods of estimating (*a*) (by examining samples mounted in Canada balsam under the microscope to distinguish silicate and quartz grains) and of determining readily available bases (by use of a simplified electrolytic filter and flame photometer tests) are described. Soil types recognized (coloured photographs) are podzolic brown earth, brown-earth podzol and podzol. The browning, podzolization, biological accumulation of nutrients, and the forest types and their productivity are discussed.

44. SCHLÜTER, H. Ein Beitrag zur Frage ökologischer und soziologischer Artengruppen mit einem Beispiel aus dem Thüringischen Schiefergebirge. **[Ecological and plant-sociological species groups with an example from the Thuringian Schiefergebirge.]** *Arch. Forstw.* 6 (1), 1957 (44–58 + 1 dgm.) 23 refs. [G.g.]

Reviews the work of various authors on the plant-sociological and ecological methods of site appraisal and classification. In a synthesis of the two methods, the 'ecological-sociological species group' is defined as consisting of species that behave more or less uniformly towards the decisive site factors, and so occur together in nature as groups of character species, differential species, or frequent companion species. As an example, 18 such groups are listed for the area concerned and the site classification is diagrammatically displayed [cf. *F.A.* 18 No. 2647]. The extreme types extend from Oak/mixed forest (driest, most fertile, alkaline, indicated

by the *Vincetoxicum* group) to montane Spruce forest (wettest, least fertile, acid, indicated by the *Blechnum spicant* group).

45. HOFMANN, G. Zur Soziologie einiger Kiefernforsten im Bereich der Kalk-Trockenlaubwälder Südthüringens. **[Plant sociology of Pine plantations in the dry hardwood forests on limestone in S. Thuringia.]** *Arch. Forstw.* 6 (4), 1957 (233–49). 7 refs. [G.g.russ.e.]

Tables show for *Pinus sylvestris* stands in (*a*) grassy Hornbeam/Beech, and (*b*) Mountain Ash/Beech, the 'substitute' communities, typified for (*a*) by *Veronica chamaedrys* (Pine site class III), *Galium verum* (IV), and *Helianthemum nummularium* (IV/V), and for (*b*) by *Primula veris* (IV/V), and *Coronilla vaginalis* (V). Productivity increases with soil moisture.

114.6. Soil Biology

See also Nos. 176 *et seq.*, 414–5, 592–3.

46. OHMASA, M., KAWADA, H., and KAWADA, A. **[A study on the microorganisms of the forest soils.]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 95, 1957 (1–70). 43 refs. [Jap.jap.e.*e.*]

A detailed study, with a 9-page English summary, of the distribution of bacteria, actinomycetes and fungi in the F, A_1, and A_2 horizons under broad-leaved and coniferous stands and of the effect on these populations of the physical and chemical properties and moisture of the soil, the season, forest type, etc.

47. SHETYE, P. K. **Soil fungi from *Tectona* and *Diospyros* forests.** *Bull. bot. Soc. Univ. Saugar* 6 (1/2), 1954 (1955), (20–3). From *abstr.* in *Biol. Abstr.* 31*D* (7), 1957 (No. 22096).

Soil fungi were studied on sites where either *T. grandis* or *D. melanoxylon* was dominant. The author isolated 27 spp. belonging to 12 genera, of which 5 spp. are new records for India.

48. MAREK, V. Výzkum půdni zvířeny ve smrkovém pralese na Pradědu. **[Investigation of the soil fauna in the primeval Spruce forest on Mt. Praděd.]** *Práce výzkum. Ust. lesn. ČSR* No. 6, 1954 (125–51). 39 refs. [Cz.cz.russ.e.]

Presents the results of counts of animals—macrofauna (Enchytraeidae, Lumbricidae, large insects and larvae) and mesofauna (mainly Acaridae and Collembola)—in soil samples taken during May-October, 1952, from 5 test plots in a natural Spruce forest over 100 years old. The highest counts were recorded in soils belonging to the *Vaccinium myrtillus* type (both N. and S. aspects); much smaller counts were found in the *Athyrium, Adenostyles* and *Calamagrostis* types.

114.7. Soil Surveys and Surveying

49. SETH, S. K., and YADAV, J. S. P. **Basic information on soil samples.** *Indian For.* 83 (8), 1957 (518–27).

Gives two revised forms now being used at Dehra Dun, together with explanatory notes: Form A to accompany soil samples; Form B for the description of soil profiles.

116. Hydrology. Water Conservation, Soil Conservation and Erosion

See also Nos. 10, 17, 400, 408–10, 435, 439, 524, 1233.

50. LONG, A. **Water and forests.** *Burmese For.* 6 (2), 1957 (165–79). 10 refs.

A general discussion of the relationship of forests to hydrology, with special reference to Burma.

51. GRANT, J. S. **Forests and stream flow.** *Malay. Forester* 20 (3), 1957 (122–6 + 3 photos). 8 refs.

Discusses research by the Coweeta Hydrologic Laboratory, N. Carolina, includes some data from the Cameron Highlands for comparison and makes recommendations on future research there.

52. RENNIE, P. J. **Effect of the afforestation of catchment areas upon water yield.** *Nature, Lond.* 180 (4587), 1957 (663–4). 5 refs.

53. FREELAND, F. D., JR. **The effects of a complete cutting of forest vegetation and subsequent annual cutting of regrowth upon some pedologic and hydrologic characteristics of a watershed in the Southern Appalachians.** *Abstr. of thesis*, in *Dissert. Abstr.* 17 (6), 1957 (1175–6). O.R.S.

Studies on two adjacent catchments showed possible differences in the number of water-stable aggregates and in humus decomposition, higher air and soil temperatures, and a much higher water yield from the clear-felled catchment.

54. WICHT, C. L., and SCHUMANN, D. E. W. **Experimental investigation of the effects of forests on stream-discharge, with recommendations for statistical analysis.** Government Printer, Pretoria. 1957. pp. 12. 18 refs. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

On the basis of experiments in various countries, attempts to summarize the present knowledge of the design and statistical interpretation of experiments using small independent catchments to test the effects of various forms of land management on stream discharge.

55. SHIRAI, J., and KONDO, M. **[Experiment in the surface run-off of different forests.]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 92, 1956 (19–40 + 5 photos). 12 refs. [Jap.jap.e.*e.*]

Examines the results of observations made since 1938 in a study linked with that on water conservation under Pine at Tatsunokuchi [see *F.A.* 15 No. 3220]. All the forested plots have good water-conserving capacity and higher infiltration rates (in which they differ little *inter se*) as compared with cleared felled areas, but this difference declines as the Pines grow up.

56. KAWAGUCHI, T., and TAKIGUCHI, K. **[Studies of soil erosion on mountain areas. (3) Experiments on erosion control function of ground cover.]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 95, 1957 (91–120 + 12 photos). 9 refs. [Jap.jap.e.]

Studies of raindrop and run-off erosion in relation to slope, rainfall intensity and ground cover under broadleaved and coniferous stands were carried out

with soil boxes in the field and in the laboratory (the latter with an artificial rainmaker). The importance of litter in preventing raindrop erosion (responsible for 80% of soil losses in summer), the reduction with increasing litter depth of surface runoff in heavy rain and of its turbidity, and the protection of the soil from freezing are emphasized. [Cf. *F.A.* 15 No. 3215.]

57. YAMANLAR, O. Kagıthane ve Alibey derelerinde toprak taşınmaları ve Haliç'in dolmasını önliyecek teknik ve külturel tedbirler üzerinde araştırmalar. **[Studies of soil erosion control in the catchments of Alibey and Kagithane streams in order to control silting up of Haliç (Golden Horn) in Istanbul.]** *Istanbul Üniv. Yay.* No. 725 (*Orm. Fak.* No. 48), 1957. pp. 171 + 11 maps, 5 gphs. 85 refs. [Turk.e.]

Bad farming practices and unsuitable land use have caused widespread erosion, resulting in silting up of Haliç. Recommendations for conservation farming, building check dams, tree planting along streams, and afforestation along the contours are made.

14. Systematic Zoology

145.7. Insecta. Entomology

See also Nos. 652 *et seq.*, 1096 *et seq.*

58. SANDS, W. A. **Some factors affecting the survival of *Odontotermes badius*.** *Repr.* from *Insectes Sociaux, Paris* 3 (4), 1956 (531–6). 7 refs. [E.] (*Termite Research Unit Reprint* No. 24, 1957.)

A study was made of the relation of *Odontotermes badius* with the fungus *Termitomyces microcarpus*, as an example of such relations in the Macrotermitinae. Biological studies of this subfamily of termites are impeded by the difficulty of keeping them alive under laboratory conditions. It was found that when supplied with fresh fungus comb, *O. badius* workers survived for up to 55 days in the laboratory with an average life of 11 days. Complete starvation produced a maximum survival of 20 days and an average of 3. Food materials, such as wood chips and cellulose, either enriched with starch or sugars or alone, gave similar results to complete starvation. Fungus comb from which the nodules had been stripped gave 30 and 6 days respectively; fungus that had been autoclaved or left to dry for some time and then re-moistened proved equally worthless in prolonging survival. It is concluded that the *Termitomyces* found on the comb of *O. badius* produces some substance or effect that tends to promote longer survival in the termites, and that this factor is largely produced by the nodules of conidia. Though it may not in itself be sufficient to support life in *O. badius* for prolonged periods, it is extremely important to the termites, since without it they are unable to survive any longer than when completely starved.

59. BACON, J. S. D., and DICKINSON, B.; GRIFFIN, O. G. **The origin of melezitose: a biochemical relationship between the Lime tree (*Tilia* spp.) and an aphis (*Eucallipterus tiliae* L.); with an appendix: X-ray data for melezitose.** *Biochem. J.* 66 (2), 1957 (289–99). 45 refs. O.R.S.

Extracts of *T. vulgaris* leaves contained large amounts of sucrose, some other sugars and only traces of melezitose. Extracts of young leaves of Larch, seedlings of *Larix leptolepis*, leaves of Ash, and Willow sap, contained no melezitose. Honeydew produced by *E. tiliae* and washed from Lime leaves in 1955 contained 40% melezitose and 39% sucrose. Honeydew of *Eulecanium coryli* on Lime twigs in 1956 contained sucrose, glucose, fructose and other sugars, but no melezitose. The excretion from *Psyllopsis fraxinicola* on Ash contained no melezitose, and washings from leaves of *Acer pseudoplatanus*, on which *Drepanosiphum platanoides* was the most abundant insect, little if any. Whole *E. tiliae* when crushed in sucrose solution brought about its hydrolysis and the concomitant formation of melezitose and 4^{a}-α-glucosyl sucrose.

60. SILVER, G. T. **Separation of the species of Arborvitae leaf miners in New Brunwick (Lepidoptera: Yponomeutidae and Gelechiidae).** *Repr.* from *Canad. Ent.* 89 (3), 1957 (97–107). 6 refs.

Descriptions of the following 4 species, emphasizing characters that aid in their identification: *Argyresthia thuiella, A. aureoargentella, A. freyella* and *Recurvaria thujaella.*

61. BEAN, J. L., and BATZER, H. O. **Mean head width for Spruce budworm larval instars in Minnesota and associated data.** *J. econ. Ent.* 50 (4), 1957 (499). 2 refs.

Tabulates the increasing mean head width (constant within the instar) of the 6 larval instars of Spruce budworm, for material from Balsam Fir in Minnesota, New York and Ontario, White Spruce in Minnesota, and Douglas Fir in Oregon. Head capsule size is an excellent criterion for the precise information required in aerial spraying. The maximum head width of the first, and the minimum of the second instar in the Minnesota material was the only overlap.

62. GARDNER, J. C. M. **Notes on larvae of the Saturniidae (Lepidoptera).** *E. Afr. agric. J.* 22 (4), 1957 (220–3). 3 refs.

Includes descriptive notes and a field key to 8 genera (17 species, of which 10 are referred to *Nudaurelia*).

63. PEARCE, E. J. **Handbooks for the identification of British insects. Vol. IV, Part 9. Coleoptera (Pselaphidae).** Royal Entomological Society of London, London. 1957. pp. 32. Price 6*s.*

64. GERBERG, E. J. **A revision of the new-world species of powder-post beetles belonging to the family Lyctidae.** *Tech. Bull. U.S. Dep. Agric.* No. 1157, 1957. pp. 55 + 14 drawings. 191 refs. P.R.

Includes sections on the distribution of the Lyctidae in the world, a key to genera, and descriptions of the species of *Lyctus, Minthea, Trogoxylon, Lyctoxylon* and *Phyllyctus.*

65. GILMOUR, E. F. **New East African Prioninae (Coleoptera, Cerambycidae).** *E. Afr. agric. J.* 23 (1), 1957 (49–63).

Describes 9 new species (6 collected by J. C. M. Gardner) and one new form, including 1 new species

of *Hovatoma*, 7 of *Macrotoma* (*Navosomopsis*), and 1 of *Acanthophorus* (*Ceratocentrum*) (with 1 new variety). Some host trees are listed.

66. PFEFFER, A. Fauna ČSR. Svazek 6: Kůrovci —Scolytoidea (Řád: Brouci—Coleoptera). [**The fauna of Czechoslovakia. No. 6: Barkbeetles.**] Československá Akademie Věd, Prague. 1955. pp. 324 + 18 plates. 17 pp. of refs. [Cz.russ.g.]

A general part (pp. 14–67) deals with the morphology of adults, eggs, larvae and pupae, and the bionomics, world distribution, phylogeny and economic importance of the Scolytidae and Platypodidae. The remainder of the work is systematic, with descriptions of all Czechoslovakian and some other species, and keys including all the European species of these families. Keys arranged under individual host species, for identification by means of gallery patterns, are also appended. There are indexes to scientific and Czech names of the plant and animal species mentioned.

15. Animal Ecology. Game and Fish Management, Hunting, Shooting and Fishing

See also Nos. 643 *et seq.*, 1232–3.

67. DIERSCHKE, F. Die Abhängigkeit der Siedlungsdichte der Vögel von Umfang, Gestalt und Dichte kleinerer Wälder. [**The relation of bird population density to size, structure and density of small forests.**] *Waldhygiene* 1 (2), 1955 (38–43). 8 refs. [G.]

A study of E. Prussian Alder woods, showing that bird populations increase with increasing unevenness of age, amount of undergrowth, and length of 'edges', and decrease with increasing density and size of stand.

68. RINEY, T. **The use of faeces counts in studies of several free-ranging mammals in New Zealand.** *Tech. Pap. N.Z. For. Serv.* No. 12, 1957. pp. 26. 21 refs. (*Repr.* from *N.Z. J. Sci. Technol.* 38 *B* (6), 1957 (507–32).)

16. General Botany

69. SPECTOR, W. S. [Editor.] **Handbook of biological data.** W. B. Saunders Company, Philadelphia and London. 1956. pp. 36 + 584. Price [£2.14*s.* 6*d.*]

Contains tabulated data, supplied by over 4000 contributors, on a variety of subjects arranged under broad headings. Contributions relating directly to tree species include: plant pigments; resins; tannins; essential oils; composition of cell sap; mineral composition of shoots, leaves, seeds, and plant tissues; chemical composition of lignified cell walls; chromosome numbers; propagation; seed production, dormancy and germination of forest trees; phenological values: size and growth rate; life span; nutrients; respiration rates; transpiration rates; osmotic relations; response to 2,4-D; toxic plants; temperature characteristics; pretreatment and germination conditions for seeds; soil pH adaptations; shade tolerance; arthropod pests; fungal parasites; dispersion of small organisms (plant diseases, seeds and pollen, insects): there are contributor and subject indexes.

160. Plant Chemistry

See also Nos. 27–8, 33–42, 59, 69, 76, 88, 137, 370, 562, 945 *et seq.*, 1176 *et seq.*

70. OVINGTON, J. D. **The volatile matter, organic carbon and nitrogen contents of tree species grown in close stands.** *New Phytol.* 56 (1), 1957 (1–11 + 1 tbl.). 15 refs. O.R.S.

Sample trees of different species were felled from plots already laid out [see *F.A.* 18 No. 4432]. Results of measurements of % contents of volatile matter, C and N of complete sections at different points on the bole and in the tree canopies, and the total weights of these constituents in the sample trees and in the whole group, are given in graphs and tables.

71. SHIBAMOTO, T., and NAKAZAWA, H. **Constitution of the inorganic components in the seed of forest trees of Japan.** *J. Jap. For. Soc.* 39 (6), 1957 (207–13). [E.e.jap.]

Tabulates the ash constituents as % dry weight, % of ash, g./1000 seeds, and as mol ratios of K, Ca, and Mg oxides and N, for *Cryptomeria japonica*, *Chamaecyparis obtusa*, *Pinus densiflora*, *P. thunbergii*, *Larix leptolepis*, *Quercus acutissima*, *Zelkova serrata*, and *Fraxinus mandshurica*.

72. NEISH, A. C. **Pungenin: a glucoside found in leaves of *Picea pungens* (Colorado Spruce).** *Canad. J. Biochem. Physiol.* 35 (2), 1957 (161–7). 20 refs. O.R.S.

Pungenin, composing about 5% of the dry weight, was isolated from leaves or leafy twigs in winter. Its constitution is discussed.

73. RAUDNITZ, H. **Investigations on the chemical nature of the protein-precipitating constituents of leaves.** *For. Res. Rep. For. Comm., Lond. 1955/56*, 1957 (82–3).

Following on observations that leaves of certain tree species contain protein-precipitating substances that seem to affect the readiness with which their litter is decomposed by fungi, chemical investigations of these leaf constituents are being made. Using solvents of increasing polarity, a number of substances have been extracted from Rhododendron leaves, and work is progressing on the accumulation of sufficient quantities of them for further investigation.

74. HASEGAWA, M., NAKAGAWA, T., and YOSHIDA, S. **Occurrence of shikimic acid in plant tissues II.** *J. Jap. For. Soc.* 39 (5), 1957 (159–63). 10 refs. [E.e.jap.]

Of 164 listed species of bryophytes, pteridophytes, and angiosperms, the leaves of 84 contained this acid. The amounts present in roots, bark, sapwood, leaves, seeds, and stem are tabulated for two Pines and two woody and two herbaceous dicotyledons. The large amounts in the bark of some woody species may indicate that it is a precursor of lignin. [Cf. *F.A.* 15 No. 3236.]

75. ANET, E. F. L. J., BIRCH, A. J., and MASSY-WESTROP, R. A. **The isolation of shikimic acid from *Eucalyptus citriodora* Hook.** *Aust. J. Chem.* 10 (1), 1957 (93–4). 3 refs. O.R.S.

Comparatively large quantities of shikimic and quinic acid were found in young leaves; this is interesting in connexion with their probable incorporation into phenylalanine, tryptophan and lignin.

161. Physiology

See also Nos. 69, 164 *et seq.*, 378, 470, 537–40, 641, 788.

76. **Annual review of plant physiology.** Annual Reviews Inc., Palo Alto, Calif. No. 8, 1957. pp. 476. Many refs.

Includes the following review articles, containing many references to forest tree species: The use of aquatic plants in the study of some fundamental problems (*W. J. V. Osterhout*); Apparent free space [in plant cells] (*G. E. Briggs* and *R. N. Robertson*); Mineral nutrition of plants (*H. G. Gauch*); Nitrogen metabolism of plants: ten years in retrospect (*F. C. Steward* and *J. K. Pollard*); Photochemistry of chlorophyll (*J. L. Rosenberg*); Biochemistry of chloroplasts in relation to the Hill reaction (*K. A. Clendenning*); Auxin relations in roots (*B. Åberg*); The history and physiological action of the gibberellins (*B. B. Stowe* and *T. Yamaki*); Stock and scion relations (*W. S. Rogers* and *A. B. Beakbane*); Ascent of sap (*K. N. H. Greenidge*); Drought resistance in plants and physiological processes (*W. S. Iljin*); The sugarcane plant (*G. O. Burr* et al.); Mass culture of algae (*H. Tamiya*); Permeability of plant cells (*R. Collander*); Physiology of phloem (*K. Esau, H. B. Currier* and *V. I. Cheadle*); Physiological ecology (*W. D. Billlings*); Physiological genetics (*H. Teas*); Effects of antibiotics on plants (*P. W. Brian*); Soluble oxidases and their functions (*W. D. Bonner Jr.*).

77. WAREING, P. F. **Tree physiology.** *Nature, Lond.* 180 (4576), 1957 (77–8).

Account of a symposium at Harvard Forest, Petersham, Mass., in April 1957. The proceedings are to be published in full.

78. AHROMEJKO, A. I., and ŽURAVLEV, M. V. Izučenie skorosti vodnogo toka u drevesnyh rastenij. **[The rate of water flow in [the stems of] tree species.]** *Fiziol. Rast.* 4 (2), 1957 (164–70) 5 refs. [Russ.e.] A.P.B.

In 1954–55 the rate of movement of radio-active P^{32}, S^{35}, and I^{131} was studied in seedlings and in trees $\geq$ 12 years old of *Quercus robur, Betula verrucosa, Acer negundo, Populus tremula, Pinus sylvestris, Fraxinus pennsylvanica, Caragana arborescens,* and *Salix* sp. The rate of flow of these substances was the same as that of heavy water; observations were therefore considered to be valid for the flow of water. The rate of flow of the radio-active substances depended on the water supply of the plant. Where this was satisfactory, the velocity of the ascending current was directly related to transpiration rate and to meteorological factors, viz. light intensity, air humidity and temperature. In drought conditions and with lack of accessible soil moisture, the velocity of the ascending current increased sharply, reaching 18–25 m./min. when the m.c. of the stem was reduced to 33–36%; the velocity of the ascending current was directly related to changes in the m.c. of the site. Under the same conditions, the rate of flow in the descending current in the phloem was > 32 m./min. No relation to temperature and light was observed.

79. LADEFOGED, K. Undersøgelser over træernes vandforbrug. **[Studies on water consumption by trees.]** *Dansk Skovforen. Tidsskr.* 41 (10), 1956 (481–506). [Dan.]

Seven deciduous tree species and Norway Spruce were studied in 1954–55. Results will be given in more detail elsewhere. Measurements of transpiration rate were made by passing short waves between 2 electrodes for 20–40 sec. at 300 watts, thus warming the rising sap stream between the electrodes to ca. 80° C., and then registering with a galvanometer the moment when the warmed sap reached a thermo-element further up the tree. Comparison with other methods showed that the results were reliable. Measurements in the wet summer of 1954 showed that when soil moisture is high and steady, water consumption depends primarily on light intensity and air humidity, and more slightly on air temperature in the range 10–20°; wind strength also had some effect, maximum consumption occurring in sunny weather, with low air humidity and wind strength 3–5 Beaufort scale. In 1955 the summer was dry and sunny, and the effect of the decreasing soil moisture was determined for trees on clay and sandy soils. In early July, at the beginning of the dry period, water consumption on both types of soil was at a maximum; it decreased considerably throughout the period, and by mid- to late August was ca. 30–60% that of July. Consumption by Beech was not much affected by type of soil, Oak showed a greater reduction than Beech, especially on sandy soil, and Ash, which occurred only on the clay site, showed more rapid and extreme reduction than the other two. The differences were attributed to the different types of root system. Transpiration of individual trees varied with tree and crown size, and crown shape, and between light and shade trees. Birch, Oak and Poplar showed much higher transpiration rates than Ash, Alder, Beech and Sycamore Maple. Tabulated figures of estimated water consumption per ha. and per day in June for 25- to 30-year Beech, site class I, 1381 stems/ha., for different weather conditions, show values ranging from 40,000 litres for sunshine, air humidity 60–70%, air temperature 20–25°, through 20,000 litres for overcast skies, air humidity 85–90%, air temperature 13–16°, to 0 for wet weather.

80. GEORGESCU, C. C., and NIŢU, G. Contribuţii la studiul circulaţiei sevei la pinul negru sănătos şi în curs de uscare. **[The circulation of sap in *Pinus nigra* trees, both healthy and suffering from dieback.]** *Bul. şti. Acad. Repub. rom.* (*Sect. biol*). *Ser. bot.* 9 (1), 1957 (87–103 + 1 plate). 3 refs. [Rum.russ.f.] O.R.S.

Sap flow was studied in healthy and dieback trees in a plantation aged 55–60 years, in which the dieback was due to the drought of 1945–50. Trees were injected with a 3% aqueous solution of fuchsin to facilitate observation. The dye moved in the sapwood, and, to a less degree, also in the

heartwood, right across the tree at the level of injection. In the vertical direction it moved in an irregular spiral, right-handed or left-handed, owing to the twisting of the fibres. The curve of diurnal variation for rate of flow was similar to that of transpiration rate. The rate of flow was influenced by width of annual ring, being greater in narrow rings. Rate of sap flow decreased with increasing dieback of the crown, and almost ceased when $\frac{3}{4}$ of the crown was dead (0·06–0·9 m./hour compared with 0·5–1·36 m./hour in healthy trees). Rate of flow in branches was 3–5 times as great as that in the stem, decreasing gradually from base to summit of crown, and being more intense on the south than on the north side of the crown.

81. GEORGESCU, C. C., MOCANU, V. G., and CATRINA, I. Contribuţii la studiul mersului normal şi patologic al transpiraţiei, ofilirii şi umidităţii lujerilor tăiaţi la pinul negru sănătos şi vătămat. **[The normal and pathological physiology of transpiration, wilting, and moisture in cut shoots from healthy and injured trees of *Pinus nigra*.]** *Bul. şti. Acad. Repub. rom.* (*Sect. biol.*) 8 (4), 1956 (739–53). 6 refs. [Rum.russ.f.] O.R.S.

Transpiration was measured (by the Huber-Ivanov method) on cut shoots from (*a*) healthy trees of *P. nigra* ca. 50 years old and (*b*) similar trees that had been subjected to boring with a Pressler borer at breast height for $\frac{1}{4}$, $\frac{1}{2}$, or $\frac{3}{4}$ of the circumference. It was shown that the progress of transpiration in the cut shoots reflected the vitality of the tree from which they had been cut.

82. GEORGESCU, C. C., and CATRINA, I. Cercetări de fiziologie normală şi patologică la pinul negru cu fenomene de uscare. II. Dinamica apei din lemn la exemplare sănătoase sau în curs de uscare. **[Studies in the normal and pathological physiology of *Pinus nigra* with symptoms of dieback. II. Movement of water in the wood of healthy subjects and of those suffering from dieback.]** *Bul. şti Acad. Repub. rom.* (*Sect. biol.*) *Ser. bot.* 9 (2), 1957 (173–93 + 3 dgms.). 6 refs. [Rum.russ.f.] O.R.S.

Measurements were made in May and Sept. of m.c. of stemwood of trees displaying different degrees of dieback. (*a*) In trees where $\frac{1}{4}$ of the crown was affected there was an accumulation of moisture in the stem, due to the reduction in foliage while the root system was unaffected. (*b*) With more advanced dieback ($\frac{1}{2}$–$\frac{3}{4}$ of crown), m.c. of wood decreased relatively to that in healthy trees, particularly in the lower part of the stem, showing that the reduction in foliage was accompanied by decreased water uptake by the roots. (*c*) In trees with completely dead crown but still living roots, there was an accumulation of water in the butt, where m.c. of heartwood can reach 160–180% or 4–5 times that in healthy trees. In stage (*b*) an accumulation of water was found in the stem, 30–40 cm. below the level of dieback; this probably acts as a barrier to the spread of mycelium of rot fungi. The most critical period, during which water deficits may occur in the wood, is the month of May. Barking produces a shock which manifests itself during the first 5 days by a sharp fall in m.c. followed by a rise; during the summer, permanent wilting of foliage begins 10 days after barking. In uprooted trees, dieback occurs rapidly and affects the whole crown, and diminution of m.c. of the wood begins at the butt and progresses up the stem. In felled trees, a sharp drop in m.c. occurs during the first 5 days after felling, after which the loss of moisture is slower.

83. POGREBNJAK, P. S., IL'KUN, G. M., and SOLOPKO, A. A. Učet rashoda vlagi lesom po gradientu isparjaemosti. **[Estimating the moisture loss of a forest from the evaporation gradient.]** *Dokl. Akad. Nauk SSSR* 113 (2), 1957 (454–7). 6 refs. [Russ.] A.P.B.

If two evaporimeters are set at different heights in an atmosphere where diffusional exchange of water vapour is proceeding, the difference in evaporation so measured will approximate to actual evaporation. The authors describe several experiments on the estimation of transpiration by this method, using (*a*) Solopko evaporimeters placed among and 1·5 m. above, the foliage of seedlings or trees, and taking control measurements by Ivanov's rapid weighing method (*b*). For 4-year seedlings of Pine and Red Oak, and 1-year coppice of 'Canadian' Poplar, (*a*) gave figures 3–6% and for 1-year Pine, 17% above those from (*b*). These differences are ascribed to the influence of evaporation from the soil as well as transpiration. In summer 1956, the method was tried on open-grown 10- to 15-year Pine, Birch, and Oak, using several evaporimeters in various parts of the crown, and at 3–5 cm. above the soil and 1·5 m. above the crowns. Results for (*a*) were 5·3, 5·8, and 0·8% above those for (*b*), for the 3 species in the order given. Further experiments in a 20-year closed Pine stand (i) and in the open (ii) showed that whereas the evaporation gradient for (ii) was rectilinear above 1–2 m. height, that for (i) showed two minima—one near the soil and one in the canopy. Records of evaporation, humidity and temperature throughout the day at various levels in this stand showed that the evaporation curve approximated to that of saturation deficit. Results are given in graphs and tables.

84. KRASULIN, N. P., and PANKRATOVA, N. M. Transpiracija kak pokazatel' pogloščenija vody kornevoj sistemoj drevesnyh porod. **[Transpiration as an indicator of water uptake by the roots of tree species.]** *Dokl. Akad. Nauk SSSR* 113 (4), 1957 (927–9). 5 refs. [Russ.] A.P.B.

In summer 1951 studies were made in Rostov province of the transpiration of 23-year-old Oak/Ash stands using Ivanov's method. Measurements were made on 2 sample plots (*a*) with good tree growth, and (*b*) with Oak suppressed, though Ash grew well. A drought in July was broken in August by rain penetrating to a depth of 16–18 cm. Data are presented on the transpiration of both species for the 3 months. Ash showed a greater capacity for adapting its water uptake to the water supply, limiting it in poor moisture conditions, and increasing it sharply when there was sufficient moisture. Where there was little moisture Ash was a dangerous competitor of Oak, e.g. on (*b*) Oak was suppressed and stag-headed.

85. OBRAZCOVA, V. I. Zimnjaja transpiracija derev'ev i kustarnikov v uslovijah stepnoj zony Ukrainy. **[Winter transpiration of trees and shrubs in the steppe region of the Ukraine.]** *Fiziol. Rast.* 3 (5), 1956 (409–13). 9 refs. [Russ.] A.P.B.

At Dnepropetrovsk the transpiration of 20- to 24-year trees of *Quercus robur*, *Acer* spp., *Fraxinus* spp., *Gleditsia triacanthos*, *Robinia pseudoacacia* and *Elaeagnus angustifolia*, was measured by the rapid weighing method in the winters of 1953 and 1954/55. Transpiration was greatest for *Q. robur* var. *tardiflora*, and least for *A. platanoides* and *F. excelsior*. During the mild winter of 1954/55 transpiration was higher than in the preceding winter, particularly for *A. platanoides*, *A. negundo* and *Q. robur* var. *praecox*. Data on the water content of shoots are tabulated.

86. JAROSLAVCEV, G. D. O transpiracii peresažennyh derev'ev. **[The transpiration of transplanted trees.]** *Fiziol. Rast.* 3 (5), 1956 (405–8). 11 refs. [Russ.] A.P.B.

In the Chardzhou province, Turkmen S.S.R., transpiration during the growing season was measured by the rapid weighing method on 2 transplanted 20-year-old *Morus australis*, 3 transplanted 6-year trees and one transplanted 18-year tree of *Robinia pseudoacacia*. Transplanting took place 1-2 weeks before the first measurements were made. The transplanted trees transpired considerably less than controls (one tree in each group) at the beginning of the growing season, but transpiration gradually increased and by autumn was similar to that of controls. The initial reduction in transpiration is brought about by injury in transplanting. Young plants recover faster than older ones and are therefore more suitable for transplanting.

87. POLSTER, H. Transpirationsintensität und Wasserbedarf von Pappelklonen. **[Transpiration rate and water requirements of Poplar clones.]** *Wiss. Abh. dtsch. Akad. LandwWiss. Berlin* No. 27 (*Beitr. Pappelforsch.* No. 2), 1957 (99–147 + 1 tbl.). 38 refs. [G.g.]

Reports on experiments with 58 clones, including hybrid Black Poplars, Balsam Poplars and Aspens. Fully expanded insolated leaves taken from the upper third of 1-year-old shoots, all grown from cuttings on slightly sandy loam, were used to measure transpiration as weight-loss during short exposures. [Methods and problems involved are discussed.] Frequent measurements were taken during all daylight hours in the 1953 and 1954 growing seasons, two balances being used to enable simultaneous comparisons to be made. For the ranking of clones, morning values only were used. The daily curves of transpiration [*T*], in g. water per g. fresh leaf weight per hour, followed fairly closely those of evaporation [*E*]. Restriction of *T* by the closing of stomata was less sudden and less frequent, and occurred at higher values of *E* than with other broadleaved species for which data are available, but there were considerable differences between individual clones in their reaction to temperature, humidity, or wind. Mean values of *T* for separate clones varied between 0·94 and 1·89 on days with high *E*, and between 0·36 and 0·96 on days with low *E*. Various ways of computing mean values and comparing clones are discussed, using direct comparison; mean *T* values by g. fresh weight and by leaf area, reduced to mean *E*; and the rise of the *T* curve from 9.30 to 12 a.m., similarly reduced. All result in broadly similar groupings with certain clones of *P.* × *angulata*, *P.* × *gelrica*, *P.* × *regenerata*, *P.* × *robusta* and *P.* × *serotina* at the top of the scale, while other clones of the same hybrids showed much lower values, and with *P.* 'Oxford' and *P. trichocarpa* (all clones) at the bottom. The relevance of the findings to the assessment of specific site requirements and the determination of local races are discussed. Further computations seek to assess the transpiration of single trees or whole stands. Leaf weight per shoot varied between 22 g. (*P.* × *regenerata*) and 162 g. (*P.* × *eugenei*). From this, a mean fresh leaf weight of 5 tons/ha., with a mean *T* of 52·5 tons/day is estimated, corresponding to 466 mm. of rain during the growing season, a figure considerably higher than the estimates for other tree species found in the literature. There appeared to be a connexion between high *T* and high production of woody matter of clones, though this was not without exceptions.

88. STEVENSON, G. **Red-tinted leaves of *Nothofagus fusca* or nitrogen fixation.** *Mon. Newslett. N.Z. For. Serv.* 7 (5), 1957 (2–3).

In a paper presented to the recent A.N.Z.A.A.S. meeting at Dunedin it was shown that many plants may be able to utilize N from the air. Among plants experimented with in a minus-N culture were *Pinus radiata*, which grew rapidly and had light blue-green foliage, and *Nothofagus fusca* which grew steadily and had light-green foliage with red tints. Measurements made in 25-year-old *P. radiata* plantations at Golden Downs showed that living trees contained ca. 300 lb. N and that the soil was greatly enriched with N after 25 years of tree growth. There appeared to be no other source for these gains except in the atmosphere.

89. REUTER, G. Über Stickstoffhaushalt der Betulaceen und anderer Laub- und Nadelhölzer. **[The N economy of Betulaceae and other deciduous and coniferous species.]** *Flora, Jena* 144 (3), 1957 (420–46). 42 refs. [G.g.] O.B.D.

Citrulline and, to a more limited extent, arginine play a prominent part in the transport and storage of N in German spp. of Betulaceae. In other species examined (e.g. *Fagus* spp., *Picea* spp., and *Fraxinus* spp.) a similar function appears to be performed by aminodicarboxylic acids, their amides and alanine.

90. MAKAROV, S. N. Polovye različija u rastenii po vegetativnym i biologičeskim priznakam. **[Sex differences in plants as reflected in vegetative and biological features.]** *Bjulleten' Glavnogo Botaničeskogo Sada* No. 17, 1954 (43–8). [Russ.] From *abstr.* in *Roczn. dendrol. polsk. Tow. bot., Warsz.* 11, 1956 (548–9). [Pol.]

Dioecious plants were found in nurseries among the normally monoecious *Pinus mugo*, *P. peuce*, *Corylus colurna*, and *Juglans nigra*. In these and other plants the ♀s were taller than the ♂s; leaves of the latter showed a higher length/breadth ratio and were thicker and darker than those of the ♀s.

Sex differences are often manifested in colour (young leaves, autumn leaves, bark of shoots and stem), bark and cork structure in mature specimens, and general habit. The presence of anthocyanin, characteristic of ♂ individuals, is shown in the colour of the branch bark in *Acer negundo*. In some cases sex differences are seen in crown form, arrangement of shoots on the stem or of leaves on the shoot, direction of twist in the stem, etc. As a rule (but not in *Ginkgo*), the author found that ♀s begin and end their growth earlier than ♂s, and their wood is less susceptible to heart rot. The easiest method of determining the sex of young plants is said to be by the direction (clockwise or anti-clockwise) of the spiral arrangement of the leaves.

91. BØRSET, O. Veksten hos han- og huntrær av osp. **[Growth of male and female Aspen.]** *Medd. norske Skogforsøksv.* 14 (No. 48), 1957 (175–85). 12 refs [Nor.e.]

Female trees on a plot in S. Norway grew faster in height and diameter in 1944–52 than ♂ trees. However, it seems probable that each sex is represented by only one clone, and other experiments in seedling plantations should be made. Literature on growth of other dioecious species is discussed.

163. Embryology

92. HJELMQVIST, H. **Some notes on the endosperm and embryo development in Fagales and related orders.** *Bot. Notiser* 110 (2), 1957 (173–95). 29 refs. [E.] O.B.D.

93. HÅKANSSON, A. **Notes on endosperm in *Betula*.** *Bot. Notiser* 110 (2), 1957 (201–4). 6 refs. [E.] O.B.D.

164. Morphology

94. CODACCIONI, M. Phyllotaxie du châtaignier, quelques dispositions anormales. **[Phyllotaxy of the Chestnut, some abnormalities.]** *C.R. Acad. Sci., Paris* 244 (3), 1957 (379–82). 1 ref. [F.f.] O.R.S. [Cf. *F.A.* 18 No. 1299.]

95. **[Preparation of leaves for study of mid-ribs and veins.]** *Rep. S. Rhod. For. Comm. 1955/56* [n.d.] (10).

Two methods are promising with *Brachystegia* and *Isoberlinia* spp. but not completely satisfactory with the *Eucalyptus* spp. tried: (1) boiling the leaves in a 30% solution of alcoholic potash for 3 hours to render them colourless, and then staining with safranin; (2) boiling the leaves in a 2 *N* solution of NaOH for 40 min., washing, and removing the softer tissue by rubbing. Method (2) was quick and the resulting leaf skeleton was easily handled.

96. BRADLEY, D. E., and JUNIPER, B. E. **Electron microscopy of leaf surfaces.** *Nature, Lond.* 180 (4581), 1957 (330–1). 2 refs.

Describes a technique for obtaining replicas of leaf surfaces without the use of organic solvents.

97. MERGEN, F., and KOERTING, L. E. **Initiation and development of flower primordia in Slash Pine [*Pinus elliottii*].** *For. Sci.* 3 (2), 1957 (145–55). 17 refs.

Describes from microtome sections (illustrated) the differentiation and growth of the ♂ and ♀ strobili. The former were initiated at the end of June, grew for 6 weeks and entered a resting stage. The latter began in the latter part of August and continued growth through the winter.

98. MAGINI, E. Riconoscimento pratico dei semi e delle piantine forestali. **[Practical identification of forest seeds and seedlings.]** *Ital. for. mont.* 12 (3; 5), 1957 (130–42, 240-63). [It.]

An analytical key and drawings for the identification of seeds and seedlings of the forest species commonly grown in Italy.

165. Phylogeny, Evolution. Heredity, Genetics and Breeding: Variation

See also Nos. 304 *et seq.*, 611, 629, 898, 901, 1255.

99. VLOTEN, H. VAN. **The development and organization of forest tree improvement in the Netherlands.** *Euphytica* 6 (1), 1957 (14–7). 2 refs. [E.du.] O.R.E.

The activities of the various bodies concerned, recently combined under the Stichting ter Verbetering van Voortkwekingsmateriaal van Houtopstanden are briefly discussed, with special reference to work on Scots Pine, Poplars, and Elms.

100. RUDOLPH, T. D., LIBBY, W. J., and PAULEY, S. S. **Jack Pine variation and distribution in Minnesota.** *Minn. For. Note* No. 58, 1957. pp. 2. 2 refs.

101. **[Slash × Shortleaf Pine hybrids.]** *Rep. Sth. For. Exp. Sta. 1956*, 1957 (19).

Survival of these hybrids after 2 years in the field was twice that of Slash Pine controls, and several of them are taller than any of the controls.

102. COLE, F. R. **The pharmacognosy of Utah Pinyon Pines.** *Abstr. of thesis*, in *Dissert. Abstr.* 17 (2), 1957 (375–6). O.R.S.

During the collection of material from the Sabie mountains for experimental extraction, in addition to the typical *Pinus edulis* and *P. monophylla*, a third form exhibiting both needle types on the same tree was found. Counts on transverse sections of needles showed no difference in mean resin-duct numbers at the 0·5 probability level for the 3 forms from the Sabie mountains, indicating that the collections were made in an ecotone and that hybridization had probably occurred. *P. edulis* and *P. monophylla* collected about 125 miles to each side of the ecotone had resin-duct numbers significantly different from each other and from the Sabie mountain forms. Results of extraction and analysis of the needle oil suggests that an oil industry might be set up in Utah and that yields of 60 gal. Pinyon oil might be obtained from an average acre of Pinyon/Juniper forest.

103. OUDIN, A. L'individualité chez le pin maritime (*Pinus pinaster* Sol.). **[Chemical peculiarities of individuals of *P. pinaster*.]** *C.R. Acad. Sci., Paris* 244 (23), 1957 (2854–5). [F.] O.R.S.

The normal optical rotation for turpentine of *P. pinaster*, based on measurements of commercial turpentine, is −30°, but individual trees have shown

rotations of +2, +3 and exceptionally +12°. Offspring from trees with abnormal rotations showed rotations ranging from +4° 25′ to −38° 5′, indicating the existence of physiological races distinguished by the optical properties of products of the resin.

104. FIELDING, J. M., and NICHOLSON, D. I. **A hybrid between *Pinus patula* and *P. greggii*.** *Aust. For.* 20 (2), 1956 (104–5).

Describes an artificial hybrid obtained by pollinating a tree of *P. patula* with pollen from *P. greggii*.

105. KOZDON, P. La selección de semillas de pino insigne y otras especies forestales. [**Seed selection in *Pinus radiata* and other forest species.**] *Chile maderero* 5 (3), 1955 (1,3, 9). [Span.]

The author considers that there are 3 races of *P. radiata* in Chile, distinguished by their branching habit. He discusses the importance of growing *P. radiata* from selected seed, and gives some notes on a race found in the Sierra Ventana (Argentina), characterized by its clean bole and uniform growth.

106. THULIN, I. J. **Application of tree breeding to New Zealand forestry.** New Zealand Forest Service, Wellington. 1957. pp. 12.

Deals mainly with breeding experiments with *Pinus radiata* and provenance research on *Pseudotsuga taxifolia* and *Pinus* spp.

107. MATTHEWS, J. D., and MCLEAN, C. **Improvement of Scots Pine in Britain by selection and breeding.** Forestry Commission, London. 1957. pp. 14. 40 refs. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

An account of the Forestry Commission's programme.

108. SPAHLINGER, D. Zur Frage der erblichen Feinästigkeit der Kiefer. [**Fineness of branches as a hereditary character in Pine.**] *Forst- u. Holzw.* 12 (14), 1957 (233–7). 17 refs. [G.g.]

Discusses the branching habit of German races of Pine, and suggests early testing for this character by measuring the branches at a height of 1 m. on grafted offspring of phenotypically fine-branched trees, assuming with Mayer-Wegelin [cf. *F.A.* 14 No. 3385] that branch thicknesses at this height will be ½ those at 7 m.

109. AASS, I. En cytologisk analyse av Skjåkfurua. [**A cytological analysis of Scots Pine from Skjåk.**] *Medd. norske Skogforsøksv.* 14 (No. 48), 1957 (93–109). 7 refs. [Nor.nor.e.]

A cytological study was made of 24 individuals having the habit of shrubs or trees from a stand of abnormal Scots Pine (including creeping forms and erect shrubs with abnormally short needles, and dwarf trees with needles of varying length). All material was found to be diploid, but compared with samples from normal trees there were frequent deviations from normal meiosis, and an unusually large number of diploid pollen grains in some individuals. It is probable that there are polyploids in the stand and that polyploids will occur in hybrids with normal Scots Pine.

110. SHIBATA, K., OGOSHI, Y., and NAKATA, G. [**Cytological studies on coniferous plants. I. Chromosome numbers of several species of *Chamaecyparis*, *Cryptomeria*, and *Pinus*.**] *Kromosomo, Tokyo* No. 29, 1956 (1025–8). [Jap.] From *abstr.* in *Plant Breed. Abstr.* 27 (3), 1957 (No. 3480).

Chromosome counts and illustrations of mitotic figures are provided for 13 species of these genera.

111. BARBER, H. N., and JACKSON, W. D. **Natural selection in action in *Eucalyptus*.** *Nature, Lond.* 179 (4573), 1957 (1267–9). 12 refs.

Clinal analysis of glaucousness in several of the Tasmanian species of *Eucalyptus* has indicated very high selective coefficients for the genes controlling this character [cf. *F.A.* 17 No. 148]. The non-glaucous (green) phenotypes are characteristic of the more sheltered habitats, the glaucous phenotypes becoming the more frequent the more exposed the situation. Thus in species like *E. gigantea*, *E. pauciflora*, *E. salicifolia*, *E. gunnii*, *E. urnigera*, etc., populations in the lower altitudinal range are usually uniformly green, while at the upper altitudinal limit they are uniformly glaucous. The change may be completed over an altitude of 400–500 ft. (½–1 mile ground distance). This means that the genes controlling glaucousness are, from an evolutionary point of view, lethal in the sheltered habitats but essential to survival in the exposed. So far as is known, these clines are in equilibrium with the environment, but nothing is known about the rate of their establishment from a uniform mixed population. Some account is given of attempts being made to measure the selective coefficients per generation on *E. urnigera* by two methods. (1) The transplant method. Twelve progenies from mothers of known phenotype and altitude have been planted in two latin squares for studies of growth- and survival-rates. It will be several years before the results are available. Half the mothers used were giving both green and glaucous seedlings, so that it will be possible to test any differences in growth rate or survival between seedlings of one progeny and between different progenies. (2) A demonstration of natural selection in action by measuring the frequency of green and glaucous trees in the adult forest and also in seedlings raised in the experimental garden from open-pollinated mothers from known altitudes. The sampling procedure for seedling collection was to cover the whole altitudinal range of the species from 1900 to 3500 ft.; 67 mothers were chosen at intervals of 20–50 ft., and from each mother 50 seedlings were pricked out into tubes and grown for 6 months. Results are discussed; 12 out of 28 green mothers gave glaucous seedlings, and 17 out of 39 glaucous mothers gave green seedlings. This is strong evidence of out-crossing. When the results are plotted to show glaucous plants % against altitude, it is at once apparent that at the bottom of the cline glaucous seedlings are eliminated by natural selection as the forest matures, and at the top end green seedlings are eliminated. The theoretical implications of these findings are discussed at some length.

112. CONRAD, J. Plusbaumauswahl unter besonderer Berücksichtigung der Holzqualität. [**Th**

choice of plus trees with particular reference to wood quality.] *Forstarchiv* 28 (7), 1957 (133–7). 14 refs. [G.]

Points out the financial advantages of breeding trees with unusual figure for veneer wood, with reference to *Fagus sylvatica*, *Quercus sessiliflora*, *Fraxinus excelsior* and, in greater detail, *Acer pseudoplatanus*. Some suggestions are made for determining the wood quality of the standing tree.

113. GEORGOPOULOS, A. L'accroissement des rejets des souches comme critère de la valeur des clones du peuplier. [**The growth of shoots from cut-back rooted cuttings as a criterion of the value of Poplar clones.**] [*Docum.*] *9th Sess. int. Poplar Comm., Paris 1957* No. *FAO/CIP/89-A*, 1957. pp. 10 + 2 sets of gphs. 7 refs. [F.] Limited distribution.

From a study of height growth and shoot weight of 7 clones from Casale Monferrato and one *Populus* × *robusta*, grown at an E. Macedonian nursery, it is concluded that the first-year shoot growth of rooted cuttings is a less reliable index of a clone's value than the growth of shoots produced in the second year, after cutting back. The former is too much influenced by rooting ability, which is not necessarily correlated with subsequent vigour of growth.

114. MÜLLER, R. Altstammsorten der Schwarzpappelbastarde für den Anbau in Deutschland. 1*a*. Grundlagen des Sortenbegriffs. 1*b*. Eigenschaften der Altstammsorten. [**'Old stock varieties' of Black Poplar hybrids for cultivation in Germany. (1*a*) The bases of the concept of 'variety'. (1*b*) The characteristics of the 'old stock varieties'.**] *Holz-Zbl.* 83 (45; 73/74), 1957 (611–3; 939–43). 67 refs. [G.g.]

(1*a*) Describes breeding trials in the provenance collection at Brühl, comprising plants derived from cuttings of ca. 600 trees. The morphological and phenological evidence collected suggests that virtually all mature hybrid Black Poplars of commercial importance in Germany belong to one of 14 'varieties' which, with 2 others derived from Dutch trees, form the current 'varieties' still offered by commercial growers. In addition, 7 new, not generally introduced, 'varieties' from old trees of Central European provenance, and 6 others from Western Europe are distinguished. The author considers that each such 'variety' represents a single clone and that, apart from modern crosses, it is practically only these clones that exist in cultivation.

(1*b*) Deals with the differences in phenology (sap rise, flushing, and leaf-fall) and their relations, causal or coincidental, to disease resistance, particularly *Dothichiza populea* and rusts; habit; growth performance; site and climatic requirements. Dates (with temperatures then ruling) are tabulated for 3 stages of flushing and for leaf-fall. The author considers that the differences in soil and moisture requirements and in wood properties are not proven and, for genetical reasons, are unlikely to exist, but that climatic differences—length of growing season, influence of day-length, etc.—do exist as a consequence of the provenance of parents from different latitudes, and because of their importance for performance and disease resistance they should be studied further.

115. [**Breeding and growing Black Poplars in Rumania.**] *Rev. Pădurilor* 1957 (5), (291–314). [Rum.russ.g.f.e.]

The number is largely devoted to this subject and includes the following articles: Breeding and selection (*S. Ocskay* and *A. Clonaru*); Silviculture (*A. Clonaru*); Increment of single trees and of stands (*L. Petrescu*); Insect pests (*M. Ene*); Diseases (*V. Mocanu*); The possibilities of growing in Rumania (*N. Constantinescu*).

116. DANILOV, M. D. Rano- i pozdnoraspuskajuščiesja formy osiny. [**The early- and late-flushing forms of *Populus tremula*.**] *Bjulleten' Moskovskogo Obščestva Ispytatelej Prirody* (*Otdel Biol.*), *Moskva* 59 (5), 1954 (21–39). [Russ.] From *abstr.* in *Roczn. dendrol. polsk. Tow. bot., Warsz.* 11, 1956 (540). [Pol.]

Describes observations and experiments on the ecology, physiology and technological properties of two forms of Aspen: an early-flushing form with grey bark, and a late-flushing one with green bark. It is concluded that the difference in time of bud development is related not to dormancy, but to different temperature requirements. The late-flushing form usually grows on loamy soils on lower sites, and the early forms on sandy soils; sometimes they grow side by side. The late-flushing form is the more valuable in all respects; it is more resistant to diseases and gives more and better wood.

117. POJARKOVA, A. P. *Sorbocotoneaster* Pojark. —novyj estestvennyj mežrodovyj gibrid. [***Sorbocotoneaster* [*pozdnjakovii*], a new natural intergeneric hybrid.**] *Botaničeskie Materialy Gerbarija Botaničeskogo Instituta imeni V. A. Komarova Akademii Nauk SSSR* No. 15, 1953 (92–108). [Russ.] From *abstr.* in *Roczn. dendrol. polsk. Tow. bot., Warsz.* 11, 1956 (542–3). [Pol.]

A detailed description of the putative hybrid *Cotoneaster melanocarpa* × *Sorbus sibirica*, found (in two forms differing in leaves, inflorescence and fruit colour) in the valley of the river Aldan (E. Siberia) and claimed to be a 'hybridogenous species', possibly of Pleistocene origin. It is propagated only by seed. The paper ends with a systematic survey of hybrids in the Pomoideae.

168. Histology

See also Nos. 898 *et seq.*, 953–9.

118. MORIONDO, F. Sulla rigenerazione della struttura secondaria nelle piante superiori. [**The regeneration of the secondary structure in the higher plants.**] *Ann. Accad. ital. Sci. for.* 5, 1956 (283–99 + 19 photos). 11 refs. [It.f.]

A general discussion of wound-healing in woody species.

119. RESTOOL, D. F. **The response of isolated stem segments of *Sequoia sempervirens* (Lamb.) Endl. cultured *in vitro* to various chemical and other environmental treatments.** *Abstr. of thesis*, in *Dissert. Abstr.* 17 (4), 1957 (734–5). O.R.S.

The addition of 3% yeast extract to the basic medium, with three other supplementary substances —cysteine, certain B vitamins and ascorbic acid— inhibited growth initially, and some segments died, but growth of the surviving cultures was later enhanced. The supplementary substances were more beneficial for production of fresh weight in darkness than in light; an inhibition of buds occurred in darkness in the presence of the supplements. Naphthaleneacetic acid at 100γ/litre reduced or inhibited bud initiation and, at 50 and 100γ/litre, differentiation and growth of roots. Maleic hydrazide inhibited all growth of the segments at 10, 100 and 1000 but not at one p.p.m. The original position of the segments, and their weight at the start of the experiment, had no effect on subsequent growth. Room temperature (ca. 21° C.) provided suitable but not optimum temperature for growth, and 24° allowed better growth than 30°. At 6° buds developed slowly but normally and at 37° they formed but failed to develop. Submersion of the segments inhibited bud formation and reduced the amount of callus produced. Adenine sulphate at 40, 80 and 120 mg./litre inhibited bud initiation and fresh weight production, but this inhibition was partially alleviated by the presence of increasing concentrations of naphthaleneacetic acid at 50 and 100γ/litre.

17. Systematic Botany

120. WOOD, R. D. **Hand-sorted punched cards in taxonomic research.** *Brittonia, N.Y.* 9 (2), 1957 (65–9).

Gives a specimen code system and punch pattern for use on 5 × 8 in. 'Keysort' cards to be sorted by knitting-needle.

172.8. Eumycetes (True Fungi)

See also Nos. 570 *et seq.*, 1082 *et seq.*

121. SNELL, W. H., and DICK, E. A. **A glossary of mycology.** Harvard University Press, Cambridge, Mass. 1957. pp. xxxi + 171. Price $5·00.

122. **Bibliography of systematic mycology 1956.** *Misc. Publ. Commonw. mycol. Inst.* No. 14, 1957. pp. 33. Price 5*s.*

Lists over 500 titles, mainly of 1956, from world literature.

123. GUYOT, A. L., and MALENÇON, G. Urédinées du Maroc. I. **[Uredinales of Morocco. I.]** *Travaux de l'Institut Scientifique Chérifien, Rabat* No. 11 (*Série botanique*), 1957. pp. 184 + 4 plates. Many refs. [F.]

Describes nearly 200 species and gives indexes to fungi and host plants (including *Juniperus* spp., *Populus* sp., *Quercus ilex*, and *Salix babylonica*).

124. KOBAYASHI, T., and ITO, K. **Notes on the genus *Endothia* in Japan—I. Species of *Endothia* collected in Japan.** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 92, 1956 (81–98 + 23 photos). 26 refs. [E.e.jap.]

Covers morphology, hosts, and distribution, and illustrates the asci, germinating spores, pycnidia, stromata etc. of *E. singularis, E. fluens, E. havanensis, E. tropicalis, E. parasitica* and the new species *E. japonica* and *E. macrocarpa*, mostly occurring on dead bark or cut branches of Fagaceae and Betulaceae. *E. havanensis* occurs on 6 *Eucalyptus* spp.

125. PARKER, A. K. ***Europhium*, a new genus of the Ascomycetes with a *Leptographium* imperfect state.** *Repr.* from *Canad. J. Bot.* 35, 1957 (173–9 + 9 photos). 19 refs.

126. BARNETT, H. L. ***Hypoxylon punctatum* and its conidial stage.** *Abstr.* in *Phytopathology* 47 (7), 1957 (451).

It is concluded from culture studies that the conidial stage of *H. punctatum*, one of the common fungi found on Oak trees killed by wilt in W. Virginia, belongs to the genus *Basidiobotrys*.

174. Spermatophyta, Seed-Plants in General. Floras and Check-Lists

See also Nos. 98, 901.

127. CHAUDRI, I. I. **A contribution to the flora of Chitral State.** *Pakistan J. For.* 7 (2), 1957 (103–44). 10 refs.

128. HUNDLEY, H. G. **Change of name.** *Burmese For.* 6 (2), 1957 (213–8).

Lists changes in botanical names of Burmese forest species since 1905.

129. **A.E.T.F.A.T.—index 1956. Index of the papers on systematic phanerogamy and of the new taxa concerning Africa south of the Sahara and Madagascar.** Association pour l'Étude taxonomique de la Flore d'Afrique tropicale, Bruxelles. 1957. pp. 55. [F.E.]

130. DEIGHTON, F. C. **Vernacular botanical vocabulary for Sierra Leone.** Crown Agents for Oversea Governments and Administrations, London. 1957. pp. 176. 4 refs. Price 13*s.* 6*d.*

Consists of a preface and notes, a botanical index listing wild and cultivated plants with their vernacular names (pp. 11–85), and vocabularies in 15 vernacular languages or dialects.

131. BLACK, J. M. **Flora of South Australia. Part IV (Second edition). Oleaceae—Compositae. (Final part.)** Government Printer, Adelaide. 1957. pp. 685–1008. Price 15*s.* 6*d.* [Cf. *F.A.* 14 No. 1974.]

174.2/.7. Gymnosperms

132. CHAPMAN, J. D. **The indigenous conifers of Nyasaland.** Department of Forestry, Nyasaland. 1957. pp. 10. 2 refs. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

Widdringtonia whytei, Juniperus procera, Podocarpus milanjianus and *Podocarpus* sp.

133. BERNARDI, A. L. Recolección de *Podocarpus* sp. en selva pluvial macrotérmica del estado Miranda, a 500 mts. s.n.m. **[The collection of *Podocarpus* sp. in tropical rain forest in the state of**

Miranda, at 500 m. alt.] *Bol. Fac. Cienc. for. Univ. Los Andes* 3 (12), 1956 (22–4). [Span.]

Describes the discovery, in the Venezuelan rain forest, of a species of *Podocarpus* as yet unidentified.

176.1. Dicotyledons

See also Nos. 114, 117, 155.

134. Browicz, K. Klony północno-amerykańskie w Polsce. [**North American *Acer* species grown in Poland.**] *Roczn. dendrol. polsk. Tow. bot., Warsz.* 11, 1956 (263–85). 11 refs. [Pol.russ.e.]

Describes *A. negundo*, *A. n.* subsp. *californicum*, *A. saccharinum*, *A. macrophyllum*, *A. pennsylvanicum*, *A. saccharum*, *A. circinatum* and *A. rubrum*. [Cf. *F.A.* 17 No. 2512.]

135. Cavaco, A. Notes systématiques et biogéographiques sur les Annonacées de Madagascar et des Comores. [**Systematic and biogeographical notes on the Annonaceae of Madagascar and the Comoro Islands.**] *Bull. Jard. bot. Brux.* 27 (1), 1957 (59–93). 18 refs. [F.] O.B.D.

Notes on taxonomy and distribution, with some new species and varieties, of which several are trees, including several new species of *Polyalthia*.

136. West-Skinn, R. W. **Gold Coast trees—I. *Terminalia* spp.** *New Gold Coast Farmer* 1 (3), 1957 (95–8).

Field keys and drawings of bole and leaves.

137. Alvarez Valle, H. Estudio forestal del jaúl (*Alnus jorullensis* H.B.K.) en Costa Rica. [***A. jorullensis* in Costa Rica.**] *Abstr. of thesis*, in *Suplemento Bibliográfico de Turrialba*, *Turrialba* 6 (3), 1956 (63). [Span.] O.R.E.

The original includes a local volume table, data on increment, N content of leaves, roots and root nodules, tannin content of bark (too low for exploitation) and on the silviculture, ecology and utilization of the tree, used as a shade tree for dairy cattle in the Faja Montano Bajo region. It is considered to be identical with *A. acuminata*.

138. Krahl-Urban, J. Forstliche Studienreise nach Jugoslavien (1). Die 'slavonischen' Eichen, ihre forst- und holzwirtschaftliche Bedeutung—Geschichtliches. (2). Slavonische Stieleichen. (3). Slavonische Traubeneichen. (4). Slavonische Buchen. [**Study tour in Jugoslavia. (1) History and importance of the Slavonian Oaks. (2) Slavonian Pedunculate Oak. (3) Slavonian Sessile Oak. (4) Slavonian Beech.**] *Holz- Zbl.* 83 (30; 37; 38; 45), 1957 (391–2; 502–4; 513–14; 601–2). 54 refs. [G.g.]

Combines the author's observations with information from German and Jugoslavian literature in a description of Jugoslavian forests, and a discussion of the genetic and economic significance, past and present, of 'Slavonian' Oaks, concentrating on the extensive mixed forests of the region between the Danube and Sava in which the 3 species chiefly discussed find optimum conditions, the Pedunculate Oaks in the river bottoms, the Sessile Oaks chiefly on the S. slopes of the mountains, up to ca. 1100 m., and Beech on the N. mountain slopes. Most of the existing stands are 60–70 years old, with only small remnants of older stands, so that there is a danger of premature exploitation. The unfavourable distribution of age classes is considered as a possible cause of disturbance of ecological balance manifesting itself in severe damage by numerous insect pests and diseases. The role of pigs in creating favourable regeneration conditions is mentioned. The Pedunculate Oaks of the Sava bottomlands are considered a local race of excellent qualities, and further trials in Germany, particularly of a late-flushing variant, are recommended. The plant-geographical importance of the region for Beech, and the relationship of *Fagus sylvatica*, *F. moesiaca* and *F. orientalis* are among the subjects discussed.

139. Kostermans, A. J. G. H. Le genre *Beilschmiedia* Nees (Lauracées) au Madagascar. [***Beilschmiedia* in Madagascar.**] *Commun. For. Res. Inst., Bogor* No. 56, 1957. pp. 12. [F.e.]

Describes 3 new species, *B. cryptocaryoides*, *B. obovata* and *B. sary*, and the 6 other species found in Madagascar.

140. Kostermans, A. J. G. H. Le genre *Potameia* Dupetit-Thouars (Lauracées) au Madagascar. [**The genus *Potameia* in Madagascar.**] *Commun. For. Res. Inst., Bogor* No. 55, 1957. pp. 35. [F.e.]

Describes 19 species, including *P. antevaratra*, *P. argentea*, *P. capuronii*, *P. chartacea*, *P. elliptica*, *P. incisa*, *P. lucida*, *P. microphylla*, *P. nitens*, *P. resonjo*, *P. reticulata*, *P. rubra*, *P. salicifolia*, *P. vacciniifolia* and *P. velutina*, all new species.

141. Brenan, J. P. M. **Notes on Mimosoideae: III.** *Kew Bull.* 1957 (1), (75–96 + 2 plates).

Further revision of African *Acacia* spp. [cf. *F.A.* 18 No. 1347]. New species described are *A. erythrophloea*, *A. bullockii*, *A. mbuluensis*, and *A. elatior* (with new subsp. *turkanae*). *A. abyssinica* subsp. *abyssinica* (*A. xiphocarpa*) appears to be confined to Ethiopia, the species being represented elsewhere by the widespread new subsp. *calophylla*. *A. subalata* is reduced to a subsp. under *A. nilotica* (where 4 other subspecific contributions and one new subsp. are made). *A. raddiana*, *A. spirocarpa* and *A. heteracantha* (*litakunensis*, *spirocarpoides*, *maras*) are sunk as subspp. under *A. tortilis*. A few new varieties are also included.

142. Jones, E. W. **Report on *Chlorophora* [*excelsa*].** H.M. Stationery Office, London (for the Colonial Office). 1957. pp. iii + 108. 60 refs. Price 14*s*. (S.O. Code No. 88–384*.)

An exhaustive report, based on both literature and field work. Part 1 gives information, by countries, on the conditions in which *C. excelsa* grows as a wild tree and the history of attempts to plant it. Part 2 (the principal portion of the report), gives all essential information on silvicultural characters, reproductive behaviour, phenology, root system, nursery technique, effect of fires, insect pests, browsing damage, and experience in plantations. Tabulated data on climates of districts with *Chlorophora*, analysis of *Chlorophora* soils, increment, and phenological records, are appended.

143. HOWARD, R. A. **Studies in the genus *Coccoloba*, IV. The species from Puerto Rico and the Virgin Islands and from the Bahama Islands.** *J. Arnold Arbor.* 38 (3), 1957 (211–42).
Keys and descriptions. [Cf. *F.A.* 18 No. 2556.]

144. KOBUSKI, C. E. **A new species of *Ternstroemia* [*T. howardiana.*] from Jamaica, B.W.I.** *Rhodora* 59 (698), 1957 (36–8). O.B.D.

145. LEE, C. B. **The identification of genus *Populus* in Korea by winter twigs and buds.** *Coll. Theseon (Sci. nat.) Univ. seoul.* No. 2, 1955 (75–80). 7 refs. [E.kor.]
A key, with descriptions and drawings, to 8 species and 2 hybrids found in Korea.

146. BOOM, B. K. ***Populus canadensis* Moench versus *P. euramericana* Guinier.** *Acta bot. neerland.* 6 (1), 1957 (54–9). 16 refs. [E.e.] O.B.D.
Upholds the validity of the name *P.* × *canadensis* Moench, rejecting *P.* × *euramericana* Guinier, for the hybrids of *P. deltoides* × *P. nigra.*

147. JOVANOVIĆ, B., and TUCOVIĆ, A. O jednoj topoli novoj za floru Jugoslavije. **[A Poplar new to the flora of Jugoslavia.]** *Šumarstvo* 10 (3/4), 1957 (189–206). 15 refs. [Serb.e.f.]
A preliminary account of an apparently new pubescent form of *P. nigra*, of spreading habit, found in the Neretva valley near Čapljina.

148. JOVANOVIĆ, B. O jednoj malo poznatoj topoli (*Populus thevestina* Dode). **[A little-known Poplar (*P. nigra* var. *thevestina*).]** *Šumarstvo* 10 (1/2), 1957 (63–70). 16 refs. [Serb.e.f.]
Notes on the morphological characters and ecology of this Poplar, which is found in S. and S.W. Jugoslavia.

149. AFANASIJEV, D. Plutasti brest. **[*Ulmus suberosa.*]** *Šumarstvo* 10 (1/2), 1957 (100–4). [Serb.]
From observations at the Sarajevo experiment station the author urges that a distinction should be made between the commercially valuable *Ulmus campestris* and the worthless *U. suberosa* [cf. *F.A.* 18 No. 167]. *U. suberosa* is distinguished by its leaves, ½–⅓ as large as those of *U. campestris*, but particularly by its slow growth and low shrub-like form, with lateral branches developed on all sides in spite of pruning. Corky outgrowths were observed on seedlings 2 years after applications of fertilizer, and the healthiest plants had the largest outgrowths. It is considered unlikely that these outgrowths are of a pathological character or result from poor site conditions. If *U. suberosa* is not recognised as a separate species the author suggests that it should be distinguished as *U. campestris* var. *suberosa.*

18. Plant Ecology

181. Mode of Life, Autecology. Silvicultural Characters of Trees

See also Nos. 69, 137–8, 142, 268, 893.

150. HEINSELMAN, M. L. **Silvical characteristics of Black Spruce (*Picea mariana* (Mill.) B.S.P.)** *Sta. Pap. Lake St. For. Exp. Sta.* No. 45, 1957. pp. 30. 69 refs.
A report, compiled from published and unpublished material, on distribution, ecological conditions and life history. Data are also given on fungal and insect damage.

151. FUKAREK, P. Neke starije i novije rasprave o Pančićevoj omorici. **[Old and new information on *Picea omorika.*]** *Šumarstvo* 10 (3/4), 1957 (245–57). 10 refs. [Croat.]
Reviews information published to date on the ecology of *P. omorika*, its parasites and pests, seed characteristics and germination in cultivation.

152. RADIMIR, D. Borovi na gornjoj granici šumske vegetacije. **[Pines at the timberline.]** *Šumarstvo* 10 (1/2), 1957 (71–80). 32 refs. [Croat.e.f.]
Discusses the growth, morphology and natural range of *Pinus mugo* and *P. halepensis.* As they will grow respectively at the upper and lower tree limits, on rocky ground, and will withstand strong winds, the author recommends them for the afforestation of denuded sites and for use in windbreaks.

153. KORELL, U. Über die Anbauwürdigkeit der Schwarzkiefer im Gebiet der Deutschen Demokratischen Republik. **[The suitability of *Pinus nigra* var. *austriaca* for planting in E. Germany.]** *Forst u. Jagd* 6 (2–4), 1956 (59–60; 110–2; 150). [G.]
A general discussion of distribution, site requirements, ecological role, yield etc., including a comparison of sixteen stands of Austrian Pine in Thuringia with Scots Pine in the region, indicating that on dry (not necessarily limestone) sites Austrian Pine, and on moister sites Scots Pine is superior.

154. RUDOLF, P. O. **Silvical characteristics of Red Pine (*Pinus resinosa*).** *Sta. Pap. Lake St. For. Exp. Sta.* No. 44, 1957. pp. 32. 150 refs.
A report, compiled from published and unpublished data, on distribution, ecological conditions and life history. Data are given on average growth and yields. The most common enemies of the species are listed.

155. JOACHIM, H. F. Untersuchungen über *Populus berolinensis* Dippel. **[Investigations on *P.* x *berolinensis.*]** *Wissenschaftliche Abhandlungen, Deutsche Akademie der Landwirtschaftswissenschaften, Berlin* No. 16 (*Beiträge zur Pappelforschung* No. 1), 1956 (71–101). 22 refs. [G.g.]
Covers parentage, morphology and phenology, pests and diseases, site preferences and silviculture, yield, wood properties and uses, chiefly on the basis of literature and observations in Germany and Eastern Europe, confirming the higher susceptibility of this hybrid to bacterial and fungal diseases, particularly canker and bark necrosis with brown patches in the wood, ['*Braunfleckengrind*'] and some insect pests, especially *Saperda carcharias* and *Zeugophora flavicollis.* Yields on good bottomland or alluvial sites about equalled those of hybrid Black Poplars. Because of its narrow crown and low branching, it demands close spacing, some pruning, and no thinning, and is particularly suitable for windbreaks, despite a tendency to break at the top.

Its wood is not very suitable for peeling (match industry) but may be suitable for pulping if grown on short rotations.

156. MANTYK, A. Mehr Beachtung unseren Linden. **[Lime trees deserve more attention.]** *Forst u. Jagd* 7 (2), 1957 (84–6). 19 refs. [G.g.]

A general discussion of site requirements, use in mixtures, wood properties (including pulping properties), pests etc.

157. MOSER, L. La quercia rossa (*Quercus rubra* L.), *sinonimo* (*Quercus borealis* Michx.). **[*Q. rubra*.]** *Monti e Boschi* 8 (7), 1957 (300–9). 11 refs. [It.]

Silvicultural characters, wood properties, and growth data, with special reference to its performance in N. Italy.

158. EDWARDS, M. B. **California Black Oak —its management and economic possibilities.** *J. For.* 55 (7), 1957 (506–10). 5 refs.

Notes are given on the tolerance, reproduction, growth habits and susceptibility to fungal, insect and fire damage of *Quercus kelloggii*. Its economic importance is discussed and silvicultural recommendations are made.

159. SCHOLZ, H. F. **Silvical characteristics of Rock Elm (*Ulmus thomasii*).** *Sta. Pap. Lake St. For. Exp. Sta.* No. 47, 1957. pp. 16. 34 refs.

Data are given on the ecology, life history and chief pests of Rock Elm.

160. KADAMBI, K. ***Balanocarpus utilis*, Bedd. (syn. *Hopea longifolia*, Ayer).** *Indian For.* 83 (7), 1957 (465–8 + 2 photos). 15 refs.

Distribution, silvicultural characters, silviculture, increment, and utilization.

161. KADAMBI, K. ***Calophyllum wightianum* Wall. syn. *C. decipiens* Wight.** *Indian For.* 83 (6), 1957 (384–6 + 1 map, 1 photo). 13 refs.

Botanical description, distribution, silvicultural characters and wood properties.

162. MANGIERI, H. Nota sobre características y cultivo del cedro misionero (*Cedrela tubiflora*). **[A note on the characteristics and cultivation of *C. tubiflora*.]** *Rev. for. argent.* 1 (3), 1957 (112–4). [Span.]

Short notes on the tree, raising it from seed, planting out, enemies and pests.

181.1. Distribution, Natural Range

See also No. 165.

163. FLETCHER, P. W., and MCDERMOTT, R. E. **Influence of geologic parent material and climate on distribution of Shortleaf Pine [*Pinus echinata*] in Missouri.** *Res. Bull. Mo. agric. Exp. Sta.* No. 625, 1957. pp. 43. 36 refs.

181.2. Atmospheric Relations. Acclimatization

See also Nos. 163, 263 *et seq.*, 314, 375, 530, 1258.

164. MEYER, H. Die Bedeutung von Klimaextremen für die Frostresistenz der Weisstanne (*Abies alba* Mill.) in ihren nördlichen Randgebiet. **[The significance of climatic extremes for the frost resistance of Silver Fir at the northern limit of its range.]** *Forst u. Jagd* 7 (1), 1957 (11–4). 9 refs. [G.g.]

Analyses the effects of the severe frost of Feb. 1956 (−29° to −32° C.) on 1227 mature Silver Firs in the Erzgebirge and Elbesandsteingebirge, S. Saxony, whose crowns had been assigned to classes *a* to *d* in the previous year, according to shape, size, density, and colour of needles. It was found that 74% of *a* remained in *a* or had sunk to *b*, and 63% of *b* had sunk to *c* or *d*. Mortality in *c* and *d* (together forming 55% of the total number) was 43% compared with 10% in *a* and *b*. Areas suffering from smoke damage were most severely affected by the frost.

165. LØKEN, A. Lavlandsbjørkas (*Betula verrucosa* Ehrh.) utbredelse i Pasvikdal. **[Distribution of *B. verrucosa* in Pasvikdal [Finnmark].]** *Medd. norske Skogforsøksv.* 14 (No. 48), 1957 (315–38). 8 refs. [Nor.nor.]

Distribution is wider than previously supposed, in spite of the low mean summer temperature (10·1° C.). Stem form is good and the crown shape characteristic of the species. Sexual reproduction is rare because of unfavourable conditions for germination and seed ripening, and pollen abnormalities.

166. GOLFARI, L. Técnicas de cultivo. Condiciones ecológicas del cultivo de las Salicaceas en la Argentina. **[Cultivation techniques. Ecological conditions affecting the cultivation of Salicaceae in Argentina.]** [*Docum.*] *FAO Latin Amer. For. Comm., Buenos Aires 1954* No. *FAO/CIP/LAPC/5-A*, 1956. pp. 38. 56 refs. [Span.]

Presents data on the species of *Populus* and *Salix* cultivated in Argentina, their silvicultural requirements, ecology and distribution, and the site factors affecting their development. Short reports are also included on different regions of Argentina where these trees are grown, particularly the Paraná Delta, with notes on species cultivated, methods used in establishing and tending plantations, and factors affecting their development.

167. BRÜCKMANN, J. J. Ecotipos de álamos y zonas fototérmicas concordantes en la República Argentina. **[Poplar ecotypes and corresponding light/temperature zones in Argentina.]** *Rev. for. argent.* 1 (2), 1957 (53–9). 11 refs. [Span.span.]

Observations on Poplar varieties and clones in Argentina permit their classification into 3 groups according to the pattern of their growth rhythm. These 3 groups are matched with climatic regions of Argentina classed into three corresponding groups according to average annual temperature, beginning and end of the hot season, latitude, altitude and rainfall.

168. ZELAWSKI, W. Dalsze badania reakcji fotoperiodycznej siewek modrzewia (*Larix europaea* D.C.). **[Further researches into the photoperiodic reaction of European Larch seedlings.]** *Acta Soc. Bot. Polon.* 26 (1), 1957 (79–103). 10 refs. [Pol.pol. e.] O.B.D.

[Cf. F.A. 18 No. 184.] The response of Larch

seedlings to a short-day photo-period as early as 4 weeks after germination was confirmed. A growth cycle lasting 12 months in nature can be reduced to ca. 2 months in these and older seedlings. Response of vegetative shoots to artificial light of relatively low intensity (ca. 1000 lux) does not differ substantially from the response to light conditions nearer to the natural ones. From the third or fourth week after germination, the photoperiodic reaction in Larch seedlings is unaffected by the size of the assimilatory organs or the total organic mass of the plant. Under short-day conditions, when the daylight is supplemented by a low-intensity light (or a short interval of strong light during the night), the formation and development of leaves is not inhibited. When there is no complete darkness during the night, normal differentiation of the apical meristem and formation of the apical bud do not take place. If the alteration in the pattern of differentiation of the meristematic cells is taken as the main criterion of development, then under the conditions of the experiment, exposure to short-day periods accelerates development, but inhibits growth, whereas under continuous light the opposite is true. If the plants are given only artificial light in the day, supplemented at 'night' by artificial light of low intensity, development (formation of the apical bud) is stopped, and growth (differentiation and growth of new leaves) is greatly reduced. The dependence on day-length of differentiation in the growth rings of the wood is confirmed. Under short-day conditions elements of late wood are formed, whereas in continuous light the size and shape of the cells are approximately uniform. It is not clear whether this is a direct photoperiodic response or depends on the supply of assimilates to the cambium. *From author's summary.*

169. ROBAK, H. Sambandet mellom daglengden og avslutningen av den årlige vekstperioden hos en del nåletreslag av interesse for vårt skogbruk. **[The relation between day length and the end of the annual growth period in some conifers of interest to Norwegian forestry.]** *Medd. Vestland. forstl. Forsøkssta.* No. 31, [1957?]. pp. 62. 14 refs. [Nor.nor.e.]

To establish a 14-hour photoperiod during the summer, seeds were sown in a 'shading box' (illustrated) from which light could be excluded; for comparison seeds were sown in the open or in similar boxes either (1) uncovered or (2) covered with plexiglass, thus giving some modification of temperature and, in (2), rainfall, comparable with the shading box but without altering the natural day-length. Of the species tested *Larix leptolepis*, which has a natural summer day-length of 14 hours, reacted most noticeably. Both one- and two-year seedlings exposed to a 14-hour day formed their terminal buds several weeks earlier and overwintered more successfully than controls in the open or in the other boxes. One-year seedlings of *Abies alba* formed terminal buds very early, regardless of treatment. *Picea abies*, *P. sitchensis*, *Abies grandis*, *Pseudotsuga taxifolia*, *Tsuga heterophylla* and *Larix decidua*, all of provenences from regions with a day-length shorter than that in Norway during summer but longer than 14 hours, all formed terminal buds earlier than controls. In *T. heterophylla* and *Picea sitchensis*, frost-lifting affected the results, but otherwise the short-day treatment gave better wintering. Further experiments are planned.

170. OLSON, J. S., and NIENSTAEDT, H. **Photoperiod and chilling control growth of Hemlock.** *Science* 125 (3246), 1957 (492–4). 7 refs. O.R.S.

[Cf. *F.A.* 18 No. 185.] Two-year wildings of *Tsuga canadensis* were handled in 4 groups: (1) potted on 1 Dec. 1952 after exposure to cool autumn weather, and kept in the greenhouse with normal short days and long nights; (2) potted in early October, before frost, and chilled indoors at 5° C. for 5–15 weeks; (3) potted as in (2) but not chilled, and maintained on a natural short-day/long-night cycle; (4) as (3) but with the dark period reduced by supplementary incandescent light to 4 hours. Buds on plants in (1) or (2) began to grow as soon as the seedlings were returned to favourable temperatures. Of the unchilled plants, none of those in (3), but many in (4) opened their buds. After 9 March 1953, plants were moved to a room at 24° and given different photoperiodic treatments. Group (3) with long nights still failed to break dormancy, but with short nights did so in 5–14 weeks; the period necessary was, however, 2–3 times as long as for chilled plants (2), which broke dormancy with all photoperiods 3–5 weeks after removal from storage at 5°. With long nights, plants of (2) formed new buds in 10 weeks, while with short nights, those of both (2) and (3) continued growth until the 15th week and then only gradually began to form buds. A 4-hour night produced noticeably greater elongation than an 8-hour night or continuous light. Short-day treatments with several short dark periods interspersed with light or dim-light periods gave results comparable with long-day/short-night treatments. Results of further experiments briefly described here will be reported in more detail elsewhere.

171. VAARTAJA, O. **Photoperiodic responses in seedlings of northern tree species.** *Repr.* from *Canad. J. Bot.* 35, 1957 (133–8 + 1 plate). 9 refs.

One-month-old seedlings of 10 species were subjected to 2 photoperiodic treatments: (*a*) received a 13-hour photoperiod and two 5-hour periods of darkness interrupted by one hour of light, and (*b*) a photoperiod of 14 hours and a 10-hour night. Natural daylight was supplemented where necessary by fluorescent light (500 ft.-candles). Temperature and moisture conditions were kept close to the optimum. Under (*b*), *Larix laricina*, *Ulmus americana* and *Picea glauca* remained almost or entirely dormant for 5 to 8 months soon after germination; *Betula lutea*, *B. verrucosa* and *Pinus banksiana* grew very slowly. Under (*a*), all species grew continuously, and those mentioned above showed significantly better growth than under (*b*). *Caragana arborescens*, *Thuja plicata*, *Acer negundo* and *Pinus resinosa* showed no significant response to photoperiods. The practice of interrupting the night by a period of light is recommended for use in greenhouses.

172. FRASER, J. W., and FARRAR, J. L. **Frost hardiness of White Spruce and Red Pine seedlings in relation to soil moisture.** *Tech. Note For. Br. Can.* No. 59, 1957. pp. 5. 10 refs.

Seedlings from 4 strains each of *Picea glauca* and *Pinus resinosa* were kept in the greenhouse, either watered regularly or left 5 weeks without water, after the soil surface had been sealed with paraffin, until Sept. 23. October frosts showed that seedlings subjected to drought were less resistant, and that Spruce was more resistant than Pine.

173. GENÈVES, L. Sur le rôle des écailles dans la résistance au froid des bourgeons de marronier: *Aesculus hippocastanum.* **[The role of the scales in the resistance to cold of buds of *A. hippocastanum.*]** *C.R. Acad. Sci., Paris* 244 (15), 1957 (2083–5). 2 refs. [F.f.] O.R.S.

Simultaneous thermo-electric measurements on the surface and in the interior of the bud showed that, in spite of the scales, the growing point chills and heats up as rapidly as the atmosphere. The scales therefore afford no protection against winter frosts.

181.3. Water, Soil and Root Relations (including Bacterial and Mycorrhizal Symbiosis)

See also Nos. 14, 19, 21–30, 33–42, 70, 76, 78–88, 163, 599.

174. STONE, E. C. **Dew as an ecological factor: I. A review of the literature. II. The effect of artificial dew on the survival of *Pinus ponderosa* and associated species.** *Ecology* 38 (3), 1957 (407–22). 72 refs.

[Cf. *F.A.* 18 No. 1279.] Artificial dew at night prolonged the life of *P. ponderosa* seedlings by 3 months when growing in sandy loam and by 2 months in clay loam, after the soil m.c. had been reduced respectively to 1% above and 1% below permanent wilting point of the sunflower. *P. jeffreyi* (*a*), *P. ponderosa* (*b*), *Libocedus decurrens* (*c*), and *Abies concolor* (*d*), survived for a considerable period after the ultimate wilting point of the sunflower had been reached. Under the conditions of the study, average survival in days was: (*a*) 95, (*b*) 64, (*c*) 44 and (*d*) 35. Artificial dew at night extended the survival time of (*b*) by 30 days, (*c*) by 72 and (*d*) by 20; it had no effect on (*a*). *From author's summary.*

175. BARNER, J. Die Einwirkung der Staunässe auf die Organbildung und Physiologie von Holzgewächsen unter besonderer Berücksichtigung der Darstellung anatomischer Befunde mit Hilfe von Koordinatentransformationen. **[The influence of stagnant water on the development and physiology of woody plants, with particular reference to the representation of anatomical data by means of the transformation of coordinates.]** *Ber. dtsch. bot. Ges.* 70 (1), 1957 (3–10). [G.] O.B.D.

Comparisons were made of the growth of various young Poplar clones on (1) an area permanently flooded to a depth of 60 cm., and (2) a similar area with groundwater at 0·6 to 1·6 m. below the soil surface. Data are presented on phenology, root development, assimilation, respiration and growth-ring development.

176. MACCONNELL, J. T., and BOND, G. **A comparison of the effect of combined nitrogen on nodulation in non-legumes and legumes.** *Plant & Soil* 8 (4), 1957 (378–88). 6 refs.

Investigates the effect in water culture of different levels of combined NH_4-N and of different times of inoculation on the nodulation of *Alnus glutinosa*, *Myrica gale* and (for comparison) *Ulex europaeus*. Under similar conditions, the presence of combined N increased the weight of nodules per plant, at least at the lower levels of N, but when related to the increased total plant weight, nodule development was continuously depressed as the supply of N increased. In *Alnus*, this adverse effect on nodulation increased as the initial N status of the plant at the time of inoculation increased; this suggests that, as in legumes, the effect of combined N is exerted internally in the plant tissues. [Cf. *F.A.* 18 Nos. 2592, 3780.]

177. ŠEMAHANOVA, N. M. Rol' mikorizoobrazujuščih gribov v pitanii drevesnyh rastenij. **[The role of mycorrhizal fungi in tree nutrition.]** *Izv. Akad. Nauk SSSR* (*Ser. biol.*) 1957 (3), (317–30 + 1 plate). 25 refs. [Russ.] A.P.B.

Mycorrhizal fungi were cultured on Voznjakov's medium (5 g. glucose, 0·5 g. NH_4NO_3 and 0·5 mg. vitamin B_1 per 1 litre cabbage water), the liquid was then removed, filtered and used to treat sand cultures of one-year-old Oak and Pine seedlings (at a rate of 7·5 ml./10 kg. sand). Oak seedlings were treated with liquid from (*a*) *Scleroderma verrucosum*, (*b*) *Cenococcum graniforme*, and (*c*) *Boletus subtomentosus*; Pine seedlings with liquid from (*a*), (*b*), and (*d*) *Boletus bovinus*. The culture solution alone was used for controls. Height growth of the treated Oak seedlings in every case exceeded that of controls, and was greatest with (*c*); leaf development and dry weight of roots were greatest for seedlings with (*a*). Pine seedlings treated with (*b*) and (*d*) showed the best growth; (*b*) increased the total dry weight over that of controls by 17·2%, (*d*) by 7%. In additional experiments to test the effect on germination, Pine seeds were steeped for 3 hours in liquid from 17-day-old and 33-day-old cultures of mycorrhizal and non-mycorrhizal fungi. Results are tabulated. Non-mycorrhizal fungi, e.g. *Lycoperdon geminatum*, *Phallus impudicus* and *Psalliota campestris*, did not stimulate germination. The mycorrhizal fungi *Amanita rubescens* and *B. bovinus* increased the germination %, while *B. luteus*, *B. subtomentosus* and *C. graniforme* reduced it but stimulated the growth of the radicle. Analysis showed the presence of vitamins in varying amounts: biotin, pantothenic and nicotinic acids in *B. luteus* and *B. bovinus*; pantothenic acid in *C. graniforme*; and nicotinic acid in *B. scaber*.

178. TARABRIN, A. D. Vlijanie mikorizy na pogloščenie fosfora sejancami duba. **[The influence of mycorrhiza on the P uptake of Oak seedlings.]** *Dokl. Akad. Nauk SSSR* 112 (5), 1957 (961–3). 3 refs. [Russ.] A.P.B.

In February 1956 four acorns were sown in each of 24 glass dishes in sand culture, using Prjanišnikov's nutrient solution, but with the P reduced to ¼ of the standard amount so that most of the radioactive

isotope might reach the leaves. Half the dishes were inoculated with 100 g. each of mycorrhizal earth. After 5 months each dish received 200 c.c. of a radioactive solution of $Na_2HP^{32}O_4$ with a total activity of 106·4 millicuries. Measurements of the activity of the leaves, taken over 3 months, are tabulated. In all mycorrhizal seedlings large amounts of P^{32} were present, the amount increasing with time. In most of the seedlings lacking mycorrhizae the activity was equal to the background. Similar differences were found in the roots.

179. LEVISOHN, I. **Researches in soil mycology.** *Rep. For. Res. For. Comm., Lond. 1955/56*, 1957 (83–6).

Behaviour of mycorrhizal stock after planting in a certain soil: Trials carried out with mycorrhizal and non-mycorrhizal Scots Pine seedlings, to compare their behaviour after planting in soil from Wareham Forest, Dorset, demonstrated the superior performance of Pine seedlings raised in a more fertile heathland soil from Surrey. These plants were supplied with abundant normal mycorrhizae formed by unidentified mycelia, and a very small proportion of associations of a parasitic fungus (*Rhizoctonia sylvestris*). When planted out in the pits these trees went into severe check. The infections of *R. sylvestris*, innocuous to the development of the trees under the soil conditions in Surrey, became deleterious when brought into the different environment provided by the Wareham soil in the pit. *Effects of* Boletus scaber *on the growth of Birch and other species*: Pot-culture experiments on the effects of *B. scaber* were continued. Growth stimulation of Birch by the rhizosphere effect of this fungus was recorded in two different soils and also in Birch litter containing self-sown Birch seedlings. [Cf. *F.A.* 17 No. 2545.] *Mycorrhizal infection in cuttings*: Studies on the rhizosphere effect of mycorrhizal mycelia on tree cuttings were started by carrying out a survey of mycorrhizal infection in cuttings of (*a*) endotrophic and (*b*) ectotrophic species and (*c*) of such trees as had been observed to possess a certain 'mycorrhizal elasticity'. Among young cuttings of (*a*), some samples of all species were recorded as mycorrhizal, whereas in (*b*) only one, subnormal, cutting was mycorrhizal. Category (*c*), consisting of the genera *Populus*, *Salix* and *Eucalyptus*, may form either type of mycorrhizal association, but cuttings do so very infrequently. It is suggested that this failure is connected with the very rapid growth of these species, which may induce a deficit in the sugar content of the roots.

180. WERLICH, I., and LYR, H. Über die Mykorrhizaausbildung von Kiefer (*Pinus silvestris* L.) und Buche (*Fagus silvatica* L.) auf verschiedenen Standorten. **[Mycorrhiza development in Pine and Beech on different sites.]** *Arch. Forstw.* 6 (1), 1957 (1–23). 16 refs. [G.g.]

This detailed study covers (*a*) distribution of mycorrhizae with depth and (*b*) their structure and type, on different sites, as determined by volume sampling from trenches and counts of short roots. Frequency of mycorrhizae decreased with depth to 1·9 and 2·6 m. for Pine and Beech respectively, without relation, in this study, to site. The poor growth of trees on a poor site could not be related to scarcity of mycorrhizae, nor was the later influenced by the poor growth of the tree. For (*b*) there was no difference with site. The Pine was infected exclusively and the Beech preponderatingly, with ectotrophic types (lists are given of the fruit bodies collected). The ratio of living to dead short roots showed that only a low % live 2 years.

181. FRYDMAN, I. Mykotrofizm roślinności pokrywajacej gruzy; ruiny domów Wrocławia. **[Mycotrophy of plants growing on ruins in Wrocław.]** *Acta Soc. Bot. Polon.* 26 (1), 1957 (45–60). 13 refs. [Pol.e.] O.B.D.

A study was made in 1953–55 on plants that had colonized the ruins of houses in Wrocław, shattered during the second world war. About 140 species are represented, and half of them are mycotrophic. Observations are presented on the development of the mycorrhizae and the influence of the mycotrophic vegetation upon the soil. *From author's summary.*

182. SOBOTKA, A. Čisté kultury z plodnic mykorrhitických hub. **[Pure cultures from the sporophores of mycorrhizal fungi.]** *Práce výzkum. Úst. lesn. ČSR* No. 6, 1954 (101–23). 6 refs. [Cz.cz.russ.g.]

Describes cultures of 6 species isolated from sporophore tissue and grown on a malt/agar medium with the addition of an infusion of soil from a Scots Pine stand. The species dealt with are *Amanita muscaria*, *Boletus edulis*, *Ixocomus elegans*, *I. luteus*, *I. variegatus*, and *Xerocomus badius*. [Cf. *F.A.* 17 Nos. 1335, 3711.]

183. KARIZUMI, N. **[Studies on the form and distribution habit of the tree root.]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 94, 1957. pp. 205 + 112 photos. 119 refs. [Jap.jap.e.*e*.]

A classification of root systems with emphasis on physiological function, based on examination of 50 species (33 genera, 21 families) and illustrated by 49 drawings, tables, graphs, and diagrams showing fine- and coarse-root distribution through the profile. Three soils, the profile, pore-space, water and solid volumes of which are detailed, were concerned. The criteria used are the distribution, in 4 zones (0–30, 30–60, 60–120 and > 120 cm.) of fine and coarse roots, frequencies per 10 cm. of depth, density of fine roots, number of coarse roots, maximum rooting depth and (separately) the general habit of the root system.

181.5. Reproductive Behaviour

See also Nos. 90–1, 97, 245 *et seq.*

184. COSTIN, E. Drajonarea stejarului pufos (*Quercus pubescens* Willd.). **[Suckering by *Q. pubescens*.]** *Rev. Pădurilor* 1957 (5), (342–3). 5 refs. [Rum.]

185. FRYXELL, P. A. **Mode of reproduction of higher plants.** *Bot. Rev.* 23 (3), 1957 (135–233). 482 refs.

A review, under the main heads: Importance of knowledge of reproductive mode; Measurement of

natural crossing; Factors affecting reproductive mode; and Tabulation of modes of reproduction. The last gives for genera (and species, where information exists) codings indicating the degree of cross-fertilization, self-fertilization and apomixis.

186. ARRETINI, C. Alcuni aspetti bio-morfologici dell' antesi in giovani piante di castagno (*Castanea sativa* Mill.). **[Some bio-morphological aspects of flowering in young trees of *Castanea sativa*.]** *Monti e Boschi* 8 (7), 1957 (322–31). [It.f.e.]

Studies were made on 7500 Chestnuts of 5–11 years. Results confirm that proterogyny, proterandry, and synchrony occur regularly in different varieties. Stamen length, and consequently the production of fertile pollen, was found to be inversely proportional to proterogyny and directly proportional to proterandry and synchrony. A large number of cultivars, including all the 'Marroni' varieties, bear ♀ flowers exclusively.

187. WALCOWA, O. W. [VAL'COVA, O. V.] K biologii cvetenija jasenja obyknovennogo. **[Biology of flowering in *Fraxinus excelsior*.]** *Bjulleten' Moskovskogo Obščestva Ispytatelej Prirody* (*Otdel Biol.*), *Moskva* 58 (4), 1953 (61–70). [Russ.] From *abstr.* in *Roczn. dendrol. polsk. Tow. bot., Warsz.* 11, 1956 (537). [Pol.]

In the S.E. of Russia-in-Europe, where the fertility of this species is poor, the author found four types of flower: hermaphrodite, with 2 well developed stamens and 1 pistil; ♂, with 1–3 (mostly 2) well developed stamens; and intermediate types in which either ♂ or ♀ features were better developed. He concludes from observations on a number of trees that (1) the sex of the flowers on a tree may change in the course of years; (2) ♂ flowers are formed predominantly when the temperature falls during flower-bud formation; (3) inflorescences on shoots from dormant buds in the lower part of the tree always contain hermaphrodite flowers, even when the tree as a whole is ♂.

188. COZZO, D. La 'urraca' forestadora **[*Cyanocorax chrysops chrysops*.]** *Rev. for. argent.* 1 (2), 1957 (71–2). [Span.]

Discusses the possible role of this bird in the dissemination and/or destruction of *Araucaria angustifolia* seed.

189. OSWALD, H. Beobachtungen über die Samenverbreitung bei der Zirbe (*Pinus cembra*). **[The dispersal of *P. cembra* seed.]** *Allg. Forstztg.* 67 (15/16), 1956 (200–2). 10 refs. [G.]

Discusses the dispersal of this heavy, wingless seed by animals, particularly the role of hoarding by *Nucifraga caryocatactes* in the establishment of seedlings on ridges and high ground above the last seed trees, and makes suggestions for propagating the tree by spot-sown seed.

190. KEAY, R. W. J. **Wind-dispersed species in a Nigerian forest.** *J. Ecol.* 45 (2), 1957 (471–8). 2 refs.

An analysis of 150 woody species recorded in a small area of old secondary forest near Ibadan shows that wind-dispersed species are most abundant in the upper synusiae and become progressively rarer in the lower synusiae. This appears to be due in part to the biological handicap that species of low stature must suffer in rain forest if they have wind-dispersed seeds. Another important reason in this particular area is, however, that a large number of the wind-dispersed seeds are persistent-seral light-demanding trees and lianes. Such plants persist in the old secondary forest because they are able to grow in the upper strata of forest and remain fully exposed to the light. Some of the wind-dispersed species cannot be regarded as persistent-seral and are evidently tolerant of heavy shade in their early stages, but do not grow up unless a gap occurs. *Author's summary.*

191. CATRINA, I., and MOISIUC, G. Contribuţii privind influenţa staţiunii asupra creşterii stejarului brumăriu în plantaţii tinere. **[Site factors affecting the growth of *Quercus pedunculiflora* in recent plantations.]** *Rev. Pădurilor* 1956 (9), (569–75). [Rum.]

A detailed study of seedling development and establishment on two different sites (steppe and forest-steppe) with particular reference to climatic and edaphic factors. The steppe site was the more favourable, probably because of more and better distributed precipitation in the years immediately following planting.

181.6. Life Form, Habit. Post-Seedling Development and Form

See Nos. 90–1, 108–9, 242–3, 787–8.

181.7. Duration, Longevity, Stature; Records of Exceptional Age or Size. Effects of Age on Behaviour

See Nos. 367–8.

181.8. Phenology

See also Nos. 116, 167–71, 205, 534.

192. SCHAFFALITSKY DE MUCKADELL, M. Skovtræernes udviklingsstadier og deres betydning for skovdyrkningen. **[Developmental stages of forest trees and their importance for silviculture.]** *Dansk Skovforen. Tidsskr.* 41 (8), 1956 (385–400). 12 refs. [Dan.e.]

Grafting experiments on Beech at the Hørsholm Arboretum have shown clearly a well established juvenile stage, characterized by the retention of dead leaves through the winter. Scions from the crown or from epicormics from the upper part of mature trees lost their leaves during winter whereas those from young trees or low epicormics of old trees retained them, irrespective of the age of rootstock. [Cf. *F.A.* 18 No. 236.] The juvenile leaf-retaining stage of Beech trees grown in the open lasts 7–10, and of those grown in heavy shade at least 20 years. Beech grown under standards in moderate shade will quickly leave the juvenile stage. Trees in a late stage of development flower freely and regularly; heavily thinned Beech develops quickly and is likely to be less suitable for reserve stock, because this abundant flowering is accompanied by reduced volume increment. Research on other species is briefly discussed.

193. FRENI, C. Andamento del ciclo vegetativo di *Pinus laricio* Poir. dell'Aspromonte (Calabria). **[The course of the growth cycle in *Pinus nigra* var. *calabrica* from Aspromonte (Calabria).]** *Ann. Accad. ital. Sci. for.* 5, 1956 (249–61 + 8 photos). 11 refs. [It. f.]

A study was made on 4 trees, and the results compared with those of a similar study of Silver Fir from the same place [see *F.A.* 18 No. 231]. In both species the onset of turgescence in the cambium precedes that of cambial activity, the respective dates being mid-March and mid-April for the Fir, and mid-April for Pine. It is concluded that the commencement of cambial activity is climatically, but the date of readiness for cambial activity, genetically, controlled. The course of the growth cycle in the two species indicates that both originated in a warmer climate than they enjoy at present, the Fir in a more Atlantic and the Pine in a more continental type of climate.

194. GREGORY, R. A. **A comparison between leader growth of western conifers in Alaska and Vancouver Island.** *Tech. Note Alaska For. Res. Cent.* No. 36, 1957. pp. 2. 2 refs.

The pattern of leader growth of *Tsuga heterophylla* in S.E. Alaska was similar to that recorded in Vancouver [cf. *F.A.* 18 No. 2614]. Growth of *Picea sitchensis* in Alaska stopped abruptly and earlier than that of *T. heterophylla*, and *Pseudotsuga taxifolia* and *Abies grandis* showed a similar behaviour in Vancouver.

195. KOZLOWSKI, T. T., and WARD, R. C. **Seasonal height growth of deciduous trees.** *For. Sci.* 3 (2), 1957 (168–74). 14 refs.

Weekly measurements of height growth were made throughout the growing season on 12 trees each (2–10 years old) of 10 species. Figures are given for the mean period (in number of days) during which 90% of growth was made by each species: *Acer saccharum* 75, *A. saccharinum* 80, *Castanea mollissima* and *Aesculus hippocastanum* 91, *Gymnocladus dioicus* 36, *Pyrus americana* 39, *Betula papyrifera* 98, *Hamamelis virginiana* 84, *Cornus florida* 95, and *Oxydendrum arboreum* 89. All species began growth before the danger of spring frosts was over and ceased well before that of autumn frosts began. Differences in seasonal growth pattern suggested that some species with short growing seasons use only the previous year's photosynthate for height growth, while species with long growing seasons use the previous years' carbohydrate early in the spring and may utilize current year's photosynthate later in the summer.

196. OW, L. VON. Der Verlauf des jährlichen Höhenwachstums von Pappeln. **[The seasonal rhythm of height growth in Poplars.]** *Forst- u. Holzw.* 12 (12), 1957 (202–3). 1 ref. [G.]

In a small-scale experiment, little difference in the seasonal growth pattern was found between *Populus* × 'Rema', *P.* × *marilandica*, *P.* × *canadensis* 'Leipzig' and *P.* × 'Bachelieri', mostly 1 + 1 plants on an Isar bottomland site, observed from 10 May to 9 Oct. 1954, and one (*P.* × 'Bachelieri') also in 1955. The 4 successive quarters of total growth were reached after approximately 40, 25, 15, and 30 days The maximum recorded for 1 day was 6·5 cm. for (*P.* × 'Bachelieri') after cutting back the side shoots.

182. Synecology, Plant Sociology: General, Principles and Methods

182.1. Palaeoecology. History of Vegetation. Pollen Analysis

See also No. 1210.

197. DIMBLEBY, G. W. **Pollen analysis of terrestrial soils.** *New Phytol.* 56 (1), 1957 (12–28). 20 refs.

Methods and presentation of data, pollen content of soils (pollen deposition and decomposition), and vertical distribution.

198. ZEIDLER, H. Pollenanalyse und Standortskunde. **[Pollen analysis as an aid to site studies.]** *Waldhygiene* 1 (8), 1956 (237–48). 19 refs. [G.]

Discusses the information obtainable from pollen analysis on original vegetation and its changes, illustrated by the analysis of 5 profiles from the Upper Palatinate and Bavaria, chiefly from small bogs.

199. HAUFF, R. Pollen-analytische Untersuchungen aus dem Forstamt Schönmünzach. **[Pollen-analytical studies in the Schönmünzach region.]** *Mitt. Ver. forstl. Standortskunde Forstpfl-Zücht.* No. 6, 1957 (56–8). [G.]

Discusses the forest succession, with special reference to the role of Spruce, on the basis of 2 peat and 3 raw-humus profiles (2 of the latter starting in periods before the recent increase of Spruce).

200. EINARSSON, TH. Tvö frjólínurit úr íslenzkum mómýrum. **[Two pollen diagrams from Icelandic peat bogs.]** *Ársr. Skogræktarf. Íslands* 1957 (89–97). 3 refs. [Ice.g.*e.*]

The diagrams show no Birch in the late glacial period, an increase followed by a fall and a second increase in the post-glacial, and in the historic period (since the settlement in the ninth century), when the Birch forests were quickly destroyed, an increase in herbaceous pollen.

201. NELSON, T. C. **The original forests of the Georgia Piedmont.** *Ecology* 38 (3), 1957 (390–7). 27 refs.

From an examination of early literature, deduces the species composition of the forests before clearing and cultivation.

182.2. Succession, Alternation and Periodicity in Vegetation

See also Nos. 190, 220, 223.

202. RITCHIE, J. C. **The vegetation of Northern Manitoba. II. A prisere on the Hudson Bay lowlands.** *Ecology* 38 (3), 1957 (429–35). 11 refs.

[Cf. *F.A.* 18 No. 265.] On certain glacio-fluvial substrata there is evidence of a distinct sequence of vegetation: meadow phase → shrub phase → invading forest (*Picea glauca* and *Larix laricina*) → closed forest (*Picea glauca*) → Black Spruce open

forest (with mound-hollow topography). *From author's summary.*

203. CHING, K. K. **Forest succession on the well-drained soil in the Higgins Lake area of Michigan.** *Abstr. of thesis*, in *Dissert. Abstr.* 17 (6), 1957 (1175). O.R.S.

Presents the results of studies on climatic, edaphic and biotic factors in representative grassland, Oak, Aspen, Jack Pine and conifer/hardwood vegetation types and predicts the succession to be expected on cut-over land.

182.3. Units of Vegetation (Associations etc.: Theory)

204. KUOCH, R. I. Vegetationskundliche Schulen. II. Die Standortstypenbildung. **[I. Schools of thought in vegetation studies. II. Formation of site types.]** *Mitt. Schweiz. Anst. forstl. Versuchsw.* 32 (8), 1957 (419–56). 4 refs. [G.f.it.e.]

The author outlines the fundamental concepts and methods of vegetation studies, and compares, in tabulated form, his own school (Zurich-Montpellier) with those of E. Schmid, Du Rietz, and A. Aichinger. Part II illustrates, by a schematic example, the compilation of a map of site types from topographical, geological, petrographical, pedological, and plant-sociological maps.

205. MCMILLAN, C. **Nature of the plant community. IV. Phenological variation within five woodland communities under controlled temperatures.** *Amer. J. Bot.* 44 (2), 1957 (154–63). 8 refs. O.B.D.

Observations carried out on broadleaved species in Nebraska.

182.4. Layer Communities

206. HOSOKAWA, T., and KUBOTA, H. **On the osmotic pressure and resistance to desiccation of epiphytic mosses from a Beech [*Fagus crenata*] forest, South-West Japan.** *J. Ecol.* 45 (2), 1957 (579–91). 32 refs.

207. MIZUSHIMA, U. **Bryophytes of Asakawa experimental forest.** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 95, 1957 (181–200 + 15 photos). [E.e.jap.]

208. CANNON, J. F. M., and CANNON, M. **The stability of the epiphytic flora of pollarded Willows.** *Proc. bot. Soc. Brit. Isles* 2 (3), 1957 (226–33). 12 refs.

182.5. Synecological Measurements and Methods

209. TÜXEN, R. Die heutige potentielle natürliche Vegetation als Gegenstand der Vegetationskartierung. **[Mapping the present-day potential natural vetgetation.]** *Angew. PflSoziol., Stolzenau* No. 13, 1956 (5–42 + 9 tbls.) 306 refs. [G.]

A discussion of concepts, terminology and symbols, stressing the need for showing what would now grow on a site if left alone, rather than what did grow originally, followed by a list of (mostly German) natural vegetation maps in this sense, and tables showing the plant associations, natural or anthropogenous, for 8 N.W. German vegetation regions, with their relationships, relative frequencies etc. The areas are described as (1) *Salicion arenariae*, (2) *Juncetalia maritimi*, (3) *Querceto roboris-Betuletum*, (4) *Fageto-quercetum petraeae*, (5) *Querceto-Carpinetum typicum*, (6) *Luzulo-Fagion* and *Fageto-quercetum petraeae luzuletosum*, (7) *Asperulo-* and *Cephalanthero-Fagion*, and (8) *Piceetum hercynicum* complexes [but are not geographically defined].

210. MRÁZ, K. Waldkundliche Untersuchungen im Mittelböhmischen Bergland und Erfahrungen mit der Anwendung statistischer Maschinen bei der synthetischen Bearbeitung. **[Forest researches in the Central Bohemian Mountains and experience in the use of statistical machines for the synthesis of data.]** *Arch. Forstw.* 6 (2/3), 1957 (109–91). 145 refs. [G.g.russ.e.]

Illustrates in detail the use of punched cards for analysing numerous or otherwise unmanageable data [cf. *F.A.* 18 No. 2639]. The data include association tables for 22 natural forest communities, grouped in site categories, adapted from Pogrebnjak's 'edaphic net' [see *F.A.* 18 No. 1407]; the history of the area (from pollen analyses and the archives); and a detailed analysis of the ecological, biological, plant-sociological and phytogeographical characters of the communities, displayed in 'spectrum' diagrams illustrating the characteristics of the lower layers (shrubs, herbs and mosses) in terms of mean occurrence or constancy. In the area examined the following natural forest communities are distinguished: *Luzulo-Fagetum* (5 forest associations); *Luzulo-Abietum* (2); *Equiseto-Abietum*; *Equiseto-Alnetum*; *Alneto-Ulmetum montanae* (2); *Luzuleto-Quercetum* (6); *Pado-Fraxinetum submontanum*; *Cariceto-humilis-Pinetum*. The correlation of yield potential (yield class and diameter distribution) with the more important of these groups and types is shown in histograms.

187. Vegetation Types

See also Nos. 44–5, 190, 209–10, 226–7, 433–4, 1233.

211. SEBALD, O. Natürliche Waldgesellschaften und Waldstandorte des Winterhauchs (Südöstlicher Odenwald). **[Natural forest communities and forest sites in the Winterhauch region (S. E. Odenwald).]** *Mitt. Ver. forstl. Standortskunde ForstpflZücht.* No. 6, 1957 (20–38). 16 refs. [G.g.]

Chiefly a plant-sociological description of the main site types of this bunter-sandstone region, with notes on soils, geology, topography and suitable species. The chief forest communities distinguished are a montane and a sub-montane Atlantic Beech/Sessile-Oak forest.

212. PREISING, E. Erläuterungen zur Karte der natürlichen Vegetation der Umgebung von Göttingen. **[Notes on a map of the natural vegetation of the Göttingen area.]** *Angew. PflSoziol., Stolzenau* No. 13, 1956 (43–55 + 1 map). [G.]

Lists the 14 natural forest communities shown on the map (including 7 *Querceto-Carpineta* and 4 *Fageta*) with site characteristics, secondary communities, site fertility, appropriate land use, and suitable woody species (natural to the site and others).

213. RÜHL, A. Über die Waldgesellschaften Schleswig-Holsteins. **[The forest communities of Schleswig-Holstein.]** *Allg. Forst- u. Jagdztg.* 128 (5/6), 1957 (110–7). 24 refs. [G.e.]

A plant-sociological study. Beech communities on moraine form the predominant types in the hillier, upper diluvial, eastern region, and Oak/Beech communities on the lower diluvial sands and terminal moraines of the western 'Geest' region, with marked floristic differences between north and south.

214. PASSARGE, H. Die Wälder von Magdeburgerforth (NW-Fläming). **[The forests of Magdeburgerforth (N.W.-Fläming).]** *Wiss. Abh. dtsch. Akad. LandwWiss., Berlin* No. 18, 1956. pp. 112. 73 refs. [G.g.]

A plant-sociological study of ca. 2200 ha. on a slight elevation in the N.E. German diluvial plain N.E. of Magdeburg, covering climate, geology, soils, forest history, and recommendations of species for a number of site types. These include numerous hardwoods and conifer/hardwood mixtures. Most of the area, now predominantly under Pine, belongs to the *Quercion roboris-petraeae*.

215. AICHINGER, E. Die *Calluna*-Heiden (*Callunetum vulgaris*) und die *Erica carnea*-Heiden (*Ericetum carneae*). **[The *Calluna* heaths and *Erica carnea* heaths.]** *Angew. PflSoziol., Wien* No. 12, 1956. pp. 125. 16 refs. [G.]

An essay in the classification of *Calluna* and *Erica carnea* heaths as 'vegetation development types', based on an examination of their floristic composition, ecology and seral development. It is stressed that afforestation programmes should be based on data such as those presented.

216. SUSMEL, L. Premesse storico-climatiche e bio-ecologiche alla selvicoltura della foresta montana appenninica. **[Historical, climatic, and ecological bases of silviculture in the montane forests of the Apennines.]** *Repr.* from *Atti dell' Accademia Economico-Agraria dei Georgofili, Firenze (Ser. 7)* No. 4, 1957. pp. 42 + map. Many refs. [It.f.]

On the basis of historical and meteorological data, as well as his own observations, the author concludes that the regression of Silver Fir in the Apennines is due to human activity (overcutting and silvicultural methods favouring Beech) and that proper measures could result in the restoration of uneven-aged selection forest of mixed Beech and Silver Fir.

217. GIACOBBE, A. I lineamenti sinecologici fondamentali della foresta montana appenninica. **[The basic synecological characteristics of the Apennine mountain forest.]** *Ann. Accad. ital. Sci. for.* 5, 1956 (233–47). 26 refs. [It.f.]

In the Apennines and Sicily, Beech and Silver Fir are subjected to a cumulative summer drought of a Mediterranean type which does not affect these species in the Alps. They accordingly show synecological differences, and seedlings, for instance, do best in gaps or under light canopy where they get maximum rainfall and minimum root competition, whereas in Central Europe and the Alps regeneration occurs under shade. Silvicultural methods ought to take account of these differences.

218. BORZA, A. Caracterul şi arondarea geobotanică a vegetaţiei lemnoase în regiunile de cîmpie subcarpatice. **[Character and geobotanical zones of woody vegetation in the Subcarpathian plain.]** *Bul. şti. Acad. Repub. rom. (Sect. biol.) Ser. bot.* 9 (2), 1957 (195–204). 33 refs. [Rum.russ.f.] O.R.S.

219. KARIZUMI, N. **[The Beech forest of Hach[i]-mantai.]** *J. Jap. For. Soc.* 38 (10), 1956 (394–9). 9 refs. [Jap.jap.e.e.]

The *Fagus crenata/Sasa kurilensis* association, its characteristic species, its neighbouring associations, its sub-associations, and its communities are discussed. [Cf. *F.A.* 18 No. 3846.]

220. RICHARDS, P. W. **Ecological notes on West African vegetation. I. The plant communities of the Idaure Hills, Nigeria.** *J. Ecol.* 45 (2), 1957 (563–77 + 6 photos). 13 refs.

The chief plant communities are forest and stages in the colonization of granite surfaces by mats of the sedge *Trilepis pilosa*. The *Trilepis* mats are colonized by woody plants, including *Hymenodictyon floribundum*, and there is a succession apparently leading to forest. Three types of forest, low and high semi-deciduous and semi-montane, are described. *From author's summary.*

221. ADAMS, C. D. **Observations on the fern flora of Fernando Po. I. A description of the vegetation with particular reference to the Pteridophyta.** *J. Ecol.* 45 (2), 1957 (479–94). 14 refs.

The vegetation types described include lowland tropical rain forest, mountain rain forest, and *Schefflera* mountain forest.

222. DYKSTERHUIS, E. J. **The savannah concept and its use.** *Ecology* 38 (3), 1957 (435–42). 16 refs.

Discusses the use of the concept in N. America and stresses its usefulness, provided that a distinction is always made between savanna types and savanna sites.

223. BUDOWSKI, G. **Tropical savannas a sequence of forest felling and repeated burnings.** *Repr.* from *Turrialba* 6 (1/2), 1956 (23–33). 56 refs. [E.e.span.]

Reviews the literature, and discusses the changes in microclimate, water regime and soil, particularly the processes leading to the formation of ferruginous hardpan. These are due to the destruction of forest and repeated burnings, and result in the establishment of savanna vegetation. In the author's view, all savannas are anthropogenic in origin. Evidence is also adduced that the process can be reversed and the forest return under suitable protection.

224. TISDALE, E. W., and MCLEAN, A. **The Douglas-Fir zone of southern interior British Columbia.** *Ecol. Monogr.* 27 (3), 1957 (247–66). 38 refs.

Includes a description of the area, review of the literature, methods of study, description of the

principal communities, relationship of tree cover to understorey vegetation, biotic factors, and ecological and geographical relationships.

225. HERRERIAS, A. S. La carta forestal de México. **[Forest map of Mexico.]** *Mensajero for., Durango* 15 (153), 1957 (13 . . . 22). 15 refs. [Span.]

Details the bases for, and critically reviews, 15 vegetation maps of the whole or parts of Mexico, leading up to a description of a relief model of Mexico (horizontal scale 1 : 280,000; vertical 1 : 14,000), shown at the first national exhibition of forest industries in May 1957. A standard committee for forest mapping is recommended.

2. SILVICULTURE

See also Nos. 6–8, 115, 137–8, 142, 155, 166, 216–7, 626, 801, 840.

226. POOVAIAH, P. M. **A brief note on the Andaman forests and the problem of thinnings in regenerated areas and regulation of mixtures in the mixed deciduous crop.** *Indian For.* 83 (8), 1957 (500–4).

Describes the various methods of regenerating these forests that have been tried from time to time. The most successful was to raise the canopy to a height of 60–70 ft. and burn the debris before the fall of seeds. This ensures abundant regeneration with a minimum of weed growth. Large areas treated in this way now need thinning, and an account is given of the methods used to thin so as to obtain maximum increment while favouring the more valuable species.

227. BAUR, G. N. **Rain forest in Northern New South Wales—silvicultural problems.** Forestry Commission of New South Wales, Sydney. 1957. pp. 12. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

Describes 4 major types of rain forest (tropical, subtropical, temperate, and dry) and discusses appropriate silvicultural treatment for each.

228. SAUER, E. Waldbau auf oberem Buntsandstein im Forstbezirk Neckarschwarzach (Kleiner Odenwald). **[Silviculture on the upper bunter sandstone in the Neckarschwarzach forest district ('Little Odenwald').]** *Mitt. Ver. forstl. Standortskunde ForstpflZücht.* No. 6, 1957 (3–19 + 5 plates). 4 refs. [G.g.]

Describes the main sites of the area just S. of the Neckar with reference to soil types and topography, and to the species and mixtures growing there, with recommendations on treatment and species composition.

229. CIESLAR, R. Pappelpflanzung in Österreich (Theorie und Praxis). **[Theory and practice of Poplar growing in Austria.]** *Allg. Forstztg.* 68 (9/10), 1957 (122–31). [G.]

A general article covering many aspects, with figures (partly estimated from returns of nurserymen) on the development of Poplar growing in various parts of the country. *Populus* × *robusta* and *P.* × *regenerata* head the list of varieties.

230. IZARD, P. Le peuplier: techniques modernes de culture. **[The Poplar: modern silvicultural techniques.]** La Maison Rustique, Librairie de l'Académie d'Agriculture, Paris. 1956. pp. 94. 16 refs. [F.]

A handbook for landowners, covering economics of Poplar planting, species, site requirements, nurseries, preparing for planting, planting methods, tending, pests, yields, calculation of height and volume of standing trees, subsidies for planting in France, and the Poplar in Italy.

231. CARRERAS, A. DE LAS. Normas generales para la plantación de Eucaliptos en la región de la pradera pampeana. **[General rules for planting Eucalypts in the region of the Pampas plains.]** *Rev. for. argent.* 1 (2), 1957 (62–5). [Span.]

Covers choice of site and species, time of planting, soil preparation and tending of the stands.

22. Silvicultural Systems. Constitution and Composition of Stands; Forms of Stand

221. High Forest Systems

See also Nos. 246, 250, 854.

232. AUNG DIN, U. **Selection of silvicultural techniques.** *Burmese For.* 6 (2), 1957 (153–9). 6 refs.

Discusses the peculiar problems of Burmese forests, the silvicultural techniques suitable for different conditions, the experimental research already carried out, and subjects on which further research is desirable.

233. EHRHART, E. O. **The crop-tree plot established in 1940.** *Proc. 4th Ntheast. For. Tree Impr. Conf., Johnsonburg 1956*, 1957 (6–8). 1 ref.

Presents data on a 10-acre plot of predominantly Black Cherry/Hard Maple, established in 1940, for a study of pulpwood and veneer management [cf. *F.A.* 18 No. 2680]. In 1950 a Cherry regeneration felling was made on 2 acres, and a pulpwood felling on the remaining 8 acres. Data are given on b.a. increment in 1940 at the time of initial release, in 1945, 1950, and 1955.

234. BONNEMANN, A. Jungwuchsschonende Hiebsführung als Verfahren der Buchenverjüngung im Forstamt Gahrenberg. **[Fellings with a view to conserving young growth in the regeneration of Beech in the Gahrenberg forest district.]** *Forstarchiv* 28 (8/9), 1957 (158–64). 8 refs. [G.g.]

About 25% of the area covered by Beech in the Gahrenberg forest is occupied by over-mature trees. Uniform shelterwood felling leads to pure stands, whereas it is hoped to establish mixed stands, and damage to regeneration during felling and skidding is often heavy. To protect regeneration, a system has been devised combining the uniform system with irregular shelterwood and strip systems. The compartment is first divided by skidding lines. A small number of irregular shelterwood fellings are made

and a mixture of species is planted, to give them an advantage over Beech. In a full mast year uniform fellings are made but the felling and extraction are done not over the entire area, but in strips at right angles to the skidding lines. Any blanks in the strips are planted up and the skidding lines are either planted or left as narrow divisions. Increased danger from windthrow and sun-scorch are incurred but so far these have not proved to be significant.

235. COULON, M. DE. Le jardinage dans les hêtraies de basse altitude. **[The selection system for Beech at low altitudes.]** *Schweiz. Z. Forstw.* 108 (6), 1957 (311–21 + 1 photo). 23 refs. [F.]

Discusses the advantages and disadvantages of the system for pure Beech, and possible modifications. For the Beech forests on the southern slope of the Swiss Jura the author advocates a group selection system. Some figures are presented showing narrower mean ring widths in Beech with red heart than in sound stems from the same site.

236. MILIN, Ž., and MIŠČEVIČ, V. Prilog poznavanju strukture i prirasta u mešovitim prebirnim sastojinama jele i bukve na Goču. **[The structure and increment of mixed Silver-Fir/Beech selection forest on Mt. Goč.]** *Šumarstvo* 10 (1/2), 1957 (20–36). 7 refs. [Serb.e.f.]

From studies on 3 sample plots, data are given on the number of stems, height, basal area, volume and increment/ha. It is concluded that the ideal stocking is 400 cu.m./ha.; Fir should be cut at a d.b.h. of 60 cm. and Beech at a d.b.h. of 50 cm.

237. VAZQUEZ DEL RIO, M. Bärenthoren, un problema fundamental de la selvicultura alemana. **[Bärenthoren, a fundamental problem of German silviculture.]** *Montes, Madrid* 13 (73; 75), 1957 (7–10; 173–6). [Span.]

Discusses the history and the present state of the *Dauerwald* Pine stands at Bärenthoren [cf. *F.A.* 16 No. 3625]. During an inventory made in 1934, 3 types of vegetation were distinguished: (1) heathland in the east and centre of the stand, (2) grass formations in the west, and (3) peat bog, also in the west. While (3) is dependent upon soil conditions, the limits of the other types correspond to no differences in soil or microclimate. The greatest danger of soil degeneration is in (1). The state of natural regeneration is also discussed, along with the influence of the introduction of deciduous species since 1924. It is noticeable that the development of regeneration under cover is superior to that in the open. This is undoubtedly due to the greater activity of the soil micro-organisms, as demonstrated by the more rapid decomposition of tree stumps in the centre of the forest than on its margin.

The second part presents data on increment in the Bärenthoren stands during the decade 1924–34, and compares the results with figures based on volume tables for normal stands and with figures calculated in accordance with working plans drawn up for the Bärenthoren stands in 1872. The actual figures are higher by at least 35% than the estimated figures, a vindication of the methods used.

222. Coppice, Pollarding and Lopping Systems

See Nos. 21, 238–40.

226. Changes of Silvicultural System. Conversion (by System or Species)

See Nos. 21, 436–7.

238. HOUINS, F. La conversion des taillis simples en Moyenne-Ardenne Région de Bouillon. **[Conversion of simple coppice in the Bouillon region of the Central Ardennes.]** *Bull. Soc. for. Belg.* 64 (7), 1957 (320–30). [F.]

Describes the methods used in converting pure Oak, mixed Oak/Maple/Birch/Hornbeam, and pure Hornbeam coppice to mixed group-selection forest.

239. BEDA, G. Die Umwandlung von Niederwäldern im Tessin. **[The conversion of coppice in the Ticino.]** *Schweiz. Z. Forstw.* 108 (6), 1957 (322–35 + 2 photos). 21 refs. [G.f.]

Discusses the history of conversion of coppice, chiefly Beech, as the basis of a newly adopted official conversion policy. Early attempts were largely failures owing to faulty techniques and popular resistance, but since 1920 gradual conversions have been successfully begun in many places. Chestnut coppice is thought to be preferable to groves, being presumably more resistant to disease.

240. PARAKY, L. S. Melioracija šikara i drugih oblika degradiranih niskih šuma. **[The improvement of '*šikari*' and other forms of degraded coppice.]** [*Publ.*] *Inst. Šum. drvnu Industr., Sarajevo* 3 (2), 1956. pp. 76. 24 refs. [Croat.]

Describes 8 main types of degraded coppice, occupying 24% of the total forest land in Bosnia. Measures for improving and converting these woodlands are discussed.

228. Constitution and Composition of Stands; Choice of Species and Form of Mixture; Tree Classes; Forms of Stand

See also Nos. 1214–5, 1217.

241. COSTEA, C., and STEGARU, M. O expresie matematică a eliminării naturale cu aplicații la principalele specii forestiere din R.P.R. **[The mathematical expression of self-thinning, with application to the principal forest species of Rumania.]** *Rev. Pădurilor* 1956 (9), (575–81). 5 refs. [Rum. russ.g.]

Expounds G. F. Hilmi's method of determining a 'coefficient of self-thinning' (based on area, number of trees per unit area, climate, and relative illumination) and applies it to 5 (Rumanian) quality classes of *Abies alba*, *Picea abies*, *Fagus sylvatica*, *Quercus sessiflora*, *Q. robur*, and *Pinus sylvestris*. It is concluded that the intensity of self-thinning is generally higher in the poor than in the better quality classes, for all species.

242. SAKAGUCHI, K. *et al.* **[An analysis of Pine (*Pinus densiflora*) stands in the thicket stage, based on different stand densities.]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 93, 1957 (1–23 + 16 photos). 32 refs. [Jap.jap.e.*e.*]

Data obtained in 1954 on natural regeneration (21 plots on 2 sites), 11–14 years old, 4–10 m. high, with densities/ha. (*D*) of 300–32,000, are analysed and plotted on logarithmic paper to show the relation of *D* to volume increment (stem, branches and total) and volume of leaves; to d.b.h., clear bole length and b.h. form factor; to 1954 ring width; taper; and the ratios of bole to total volume annual increment and volume increment to weight of leaves; distribution of assimilated substances at various levels of the bole; relation of d.b.h. to volume of leaves; total basal and surface area. Critical *D* at this age is indicated as 1000 for competition and 4000–5000 for taper.

243. CAYFORD, J. H. **Influence of the Aspen overstory on White Spruce growth in Saskatchewan.** *Tech. Note For. Br. Can.* No. 58, 1957. pp. 12. 12 refs.

A study was made in 5 mixed stands of Aspen and White Spruce in Saskatchewan to determine the effect of the Aspen overstorey on the White Spruce understorey. Height, diameter and volume growth of free and suppressed Spruce were examined after the data had been sorted into three age groups based on the age of the Spruce. Results are presented which, although dependent upon a subjective selection of trees, do indicate that large differences in growth between free and suppressed Spruce may occur. The findings are summarized as follows: In young and intermediate-aged White Spruce/Aspen stands, an Aspen overstorey may considerably reduce the height and diameter growth of White Spruce. In stands up to 100 years old it may reduce their volume by as much as 50% compared with that of near-by free-growing White Spruce of the same age. White Spruce trees suppressed by Aspen may be expected to take longer to reach breast height, and eventually to overtop the Aspen, than free-growing ones.

An Aspen overstorey will lower the quality of the White Spruce which it suppresses by damaging leaders as a result of whipping, and by causing such commonly found defects as forked top, crook and sweep. It is suggested that silvicultural treatments such as releasing the White Spruce understorey as soon as it has become well established, or alternatively releasing it at 40 to 50 years of age if a sufficient return can be realized from the Aspen, may be warranted. A number of experimental cuttings have recently been made involving the release of White Spruce by the removal of Aspen in stands of different ages. Results will be reported as they become available. *From author's summary.*

244. LACHAUSSÉE, E. Une forêt vierge en Tchécoslovaquie. **[A virgin forest in Czechoslovakia.]** *Bull. Soc. for. Franche-Comté* 28 (6), 1957 (310–21 + 2 photos). 2 refs. [F.]

An account of the forest of Boubin, including some sample-plot data on increment, stand structure etc.

23. Regeneration and Formation of Stands

231. Natural Regeneration

See also Nos. 226, 237.

245. SÖDERSTRÖM, V. En föryngringsundersökning på bondeskogar i Ås socken i Jämtlands län. **[A study of [conifer] regeneration on farm forests in Ås parish, Jamtland county.]** *Norrlands SkogsvFörb. Tidskr.* 1957 (2), (271–88). 13 refs. [Sw.sw.]

The following conclusions were drawn from a study of a number of clear-felled areas 0·5–1·5 ha. in extent, at altitudes of 300–400 m. (1) Natural regeneration of conifers [Pine, or Pine and Spruce?] within a reasonable period can be expected on fresh dwarf-shrub sites (*a*) when seed trees are present, but not on sites rich in herbs and grasses (*b*); fresh *Dryopteris* dwarf-shrub sites are intermediate. (2) Regeneration on (*a*) is better on clayey than on silty moraine, and on iron-podzol and brown-earth profiles than on iron-humus-podzol profiles. (3) Optimum numbers of seed trees are 70–80 per ha. (4) Soil cultivation accelerated regeneration on (*a*) on clayey and to a less extent on silty moraines. (4) Sowing gave good results on (*a*) but not on (*b*).

246. BROBAKKEN, P. Gjenvekstundersøkelser på endel av A/S Van Severen & Co. Ltd's frøtrestillinger. **[Regeneration investigations on part of Van Severen & Co.'s seed-tree felling areas.]** *Medd. norske Skogforsøksv.* 14 (No. 48), 1957 (35–46). [Nor.]

Results of an investigation in 1954 of regeneration on Pine sites where seed-tree fellings had been made in 1947–51 are given in tables and graphs. On areas where the original stand was Pine or Pine with a little Spruce, advance growth of Pine was good and evenly distributed; burning would destroy this and might damage or destroy 10–30% of the seed trees. On the areas with larger numbers of Spruce, Pine regeneration was sparse; burning or planting or both are probably necessary to ensure regeneration of Pine within a reasonable period.

247. OLBERG, A. Beiträge zum Problem der Kiefernnaturverjüngung. **[On the natural regeneration of Pine.]** *SchrReihe forstl. Fak. Univ. Göttingen* No. 18, 1957. pp. 96. 83 refs. [G.g.]

Part 1 discusses the climatic, soil and plant-sociological position of the Pine forests of the N. German diluvial region, the effect of human interference on natural regeneration capacity (both favourable and unfavourable) and finally, whether, where, and how natural regeneration should be promoted and used. Part 2 reports on an investigation covering 1500 ha. in the Gartow district (Lower Elbe) where natural regeneration recently appeared, often abundantly, chiefly under first-generation Pine $\geqslant 60$ years old on degraded agricultural and waste land. Age and density of regeneration are analysed in relation to age, density and quality of stand, site factors, and 7 main types of ground cover. Germination and initial survival were studied on sample plots, the vegetation and most of the raw humus being removed from half of each plot, in relation to the above factors, seed crops and weather. Relationships were extremely complex; ground cover alone gave little indication of regeneration capacity, but in combination with moisture conditions (water table) constituted an important factor. The most important single factor favouring regeneration is the comparative stability of the ground vegetation, which is changing only

slowly as a result of changes in stand density, enabling the forester to wait for the necessary combinations of seed-years with suitable weather and absence of disease (during the years of the study, needlecast destroyed much promising 1- to 3-year-old growth).

248. LUTZ, R. J., and CLINE, A. C. **Results of the first thirty years of experimentation in silviculture in the Harvard Forest, 1908–1938. Part II. Natural reproduction methods in White Pine-Hemlock stands on light sandy soils.** *Bull. Harv. For.* No. 27, 1957. pp. 70. 10 refs.

249. HANSEN, H. L., and JOHNSON, R. R. **Some effects of monuron [CMU] on Eastern White Pine (*Pinus strobus*) regeneration.** *Minn. For. Note* No. 59, 1957. pp. 2.

Various quantities of monuron were applied to 1-rod plots in which old-growth *Pinus strobus* formed a scattered but uniform overstorey to mature Aspen and Paper Birch above a moderately dense understorey of Hazel (*Corylus cornuta*) and other brush, with ground vegetation consisting largely of *Carex* sp. and bracken. Spraying was done in Aug. 1954 by back-pack pumps at rates of (*a*) 16, (*b*) 32, and (*c*) 48 lb./acre in 160 gal. of water, and counts were made in Sept. 1956 on these and (*d*) control plots, to evaluate the results after 2 growing seasons. White Pine regeneration (average number of seedlings/plot) was (*a*) 6290, (*b*) 11,040, (*c*) 9550, compared with (*d*) 690. Both (*b*) and (*c*) killed Aspen within ca. 10 ft. of the plot boundaries; (*c*) killed all Hazel brush, but ca. 45% still remained on (*a*).

250. THORNTON, P. L. **Effects of cutting methods on advance reproduction in two mature mixed coniferous swamps in Upper Michigan.** *J. For.* 55 (6), 1957 (448–51). 5 refs.

In the Michigan Upper Peninsula 5 felling methods were practised on blocks of 4–10 acres in mature stands of Northern White Cedar (*Thuja occidentalis*) with *Picea mariana*, *Abies balsamea*, *Acer rubrum* and *Fraxinus nigra* as chief associated species. The methods were: (*a*) light selection, (*b*) shelterwood, (*c*) diameter limits to favour the more desirable species, (*d*) clear felling of strips 75 × 300 ft., and (*e*) clear felling of blocks 130 ft. square. The b.a. in sq. ft./acre for trees ⩾ 4·6 in. d.b.h., after felling averaged (*a*) 109, (*b*) 52, and (*c*) 31. One block was left as a control. Before felling, 2000 milliacre plots were established and the regeneration was classified before and after logging. There was abundant advance growth < 6 in. in height; Balsam Fir was the most abundant, followed by hardwoods and Cedar. A hardwood seedling or coppice shoot was dominant on > 50% of the plots. After the fellings, the total numbers of seedlings of all species were sharply reduced by accumulations of logging slash, and losses were greatest where the cut was heaviest—for (*c*) (*d*) and (*e*). No significant changes were noted in species dominance or size-class distribution [cf. *F.A.* 18 No. 2667].

251. HEINSELMAN, M. L. **Living sphagnum found most favourable seedbed for swamp Black Spruce in Minnesota study.** *Tech. Note Lake St. For. Exp. Sta.* No. 504, 1957. pp. 2.

At the Big Falls Experimental Forest, Minn., strips one chain wide were clear-felled in a dense 85-year-old Spruce stand and 180 milliacre plots were established. Immediately after logging only 2% of the plots were stocked with seedlings; after 3 growing seasons stocking had risen to > 66%. Sphagnum, which covered ca. 40% of the area, was the most favourable seedbed, accounting for > 85% of the seedlings; dead sphagnum was less favourable. Feather moss, *Dicranum* and raw litter made poor seedbeds. Three slash treatments were tried: (*a*) burning, (*b*) removing slash from the strips, and (*c*) leaving it undisturbed. The chief advantage of (*a*) and (*b*) was to reduce the area covered by raw litter. This study suggests that moss cover should be taken into consideration as a factor in Spruce regeneration.

252. LINTEAU, A. **Black Spruce reproduction on disturbed soil conditions.** *Tech. Note For. Br. Can.* No. 54, 1957. pp. 14.

Picea mariana reproduction was studied along a logging road in Quebec. It was found to be much more abundant on moss-covered than on bare mineral soil. A cool aspect is more favourable than a warm aspect on mineral soil, but aspect makes no difference on a moss-covered soil.

253. GHENT, A. W., FRASER, D. A., and THOMAS, J. B. **Studies of regeneration in forest stands devastated by the Spruce budworm.** *For. Sci.* 3 (2), 1957 (184–208). 21 refs.

Data were collected in Ontario (2 areas) and Quebec in 1950 and again in 1955 in budworm-devastated stands. They support Turner's observations [see *F.A.* 14 No. 3538] that Balsam Fir mortality is correlated with its % of total b. a. in the stand. That there is no appreciable difference in shade tolerance and reaction to release between the Fir and the Spruce (*P. glauca* and *P. mariana*) seedlings is shown by their similar frequency distribution by height classes after a 5-year interval. The decrease in numbers of Fir seedlings by 20–65% in this interval is ascribed to coverage by wind-broken budworm-killed trees (72%) and invasive shrub competition (16%). Comparison of the Fir/Spruce ratios of the original stand with those of the regeneration tallies of 1950 and 1955 show that the trend to predominance by either genus varies with the region. No general trend in favour of either is shown by comparing their ratios in the 1950 and 1955 tallies. The evidence suggests a remarkable ecological equivalence between established Fir and Spruce seedlings with some suggestion that new recruitment (particularly of Spruce) after a budworm outbreak may cause minor changes in the Fir/Spruce ratios. [Cf. *F.A.* 11 No. 1490.]

254. Bøgeselvsåning. **[Natural regeneration of Beech.]** *Dansk Skovforen. Tidsskr.* 41 (9; 10), 1956 (421–56; 562–6). [Dan.]

Three articles: Aspects of natural regeneration of Beech (genetical aspects, time needed, conditions of soil, ground cover, canopy closure etc. favouring regeneration, site cultivation and costs) (*C. M.*

Møller); Natural regeneration at Brahetrolleborg (*E. Bistrup*); and The economic aspect of natural regeneration (*H. Dons* and a comment by *C. M. Møller*).

255. BARTH, R. Die natürliche Verjüngung der Eiche in den Wäldern der Sowjetunion. [**The natural regeneration of Oak in the forests of the U.S.S.R.**] *Forst u. Jagd* 6 (7), 1956 (321–4). 4 refs. [G.]

Describes the effect of site factors and felling systems on seedling development and survival, stressing the dangers of grass, and of frost to slowly developing seedlings. Selection felling to promote regeneration in small gaps has generally proved the most successful system.

256. JARVIS, J. M. **Cutting and seedbed preparation to regenerate Yellow Birch, Haliburton County, Ontario.** *Tech. Note For. Br. Can.* No. 53, 1957. pp. 17. 4 refs.

Experiments showed that seedbed preparation is essential if Yellow Birch is to be regenerated in sufficient numbers after logging in a Maple/Beech/Birch stand. Though it will germinate well on compacted mineral soil, this medium does not favour seedling development. Seedbeds made by a D-6 Caterpillar tractor equipped with a bulldozer blade are favourable for regenerating Yellow Birch. It is necessary that enough residual trees should be girdled to provide a uniform canopy giving ca. 30% shade.

257. HARRIS, A. C. **Regeneration of Jarrah (*Eucalyptus marginata*).** *Aust. For.* 20 (2), 1956 (54–62 + 2 plates). 2 refs.

An account of the silvicultural characters and reproductive behaviour of the species, and methods of encouraging its natural regeneration in Western Australia.

258. [**Regeneration of *Borassus aethiopum.***] *Rep. For. Adm. Nth. Reg. Nigeria 1955/56*, 1957 (10).

This valuable species, the source of termite-proof constructional timber, is threatened with extinction. The radicle of the germinating fruit is regarded as a delicacy and the fruits are collected as soon as ripe and sown in specially prepared beds. Some of the native authorities are now enacting special rules for the preservation of the species.

259. [**Regeneration of *Chlorophora excelsa* from root suckers.**] *Rep. For. Dep. Tanganyika 1956*, 1957 (24).

Experimental burning of 12 stumps of felled *C. excelsa* in the Rondo reserve showed that root suckers could be produced in a year, and a high degree of success could be expected, the sucker shoots being vigorous and attaining a height of 6 ft. in the first year. It was decided that the technique was sufficiently well proved and sufficiently cheap to apply on a field scale to the entire harvested portion of the reserve.

260. PUKKILA, I. Ilmajoen hevosvetoinen laikkuri. [**A new implement for soil scarification.**] *Metsät. Aikak.* 1957 (3), (70–2). [Fi.e.]

The implement (illustrated) consists of a 4-bladed propeller mounted on a frame with handles and drawn by a horse. The operator walks behind, pressing down on the handles.

232. Artificial Regeneration

261. LETOURNEUX, C. **Tree planting practices in tropical Asia.** *FAO For. Developm. Pap.* No. 11, 1957. pp. vii + 172. 38 refs.

Deals with seed, and nursery and planting practices, in tropical Asia (including Burma, Ceylon, India, Indochina, Indonesia, Malay Archipelago, Thailand and the Philippines), and the silvicultural characters of the most commonly used species.

262. OLNEY, B. A. **A Eucalypt for timber production.** *Nyasld. Fmr. For.* 3 (4), 1957 (21–2).

In the Limbe and Blantyre districts demand is shifting from fuelwood to transmission, building and scaffolding poles, and probably flooring timber. Details are given of the nursery treatment (including potting in polythene bags) and planting of *E. microcorys* for timber suitable for all these purposes. Spacing 8 × 8 or 9 × 9 ft. is recommended.

232.1. Choice and Trial of Species, Races etc.

See also Nos. 6, 438, 1214–6.

232.11. Species Trials, including Forest Gardens, Trials of Exotics etc.

See also Nos. 153, 169, 339, 411, 1258.

263. MOULDS, F. R. **Exotics can succeed in forestry as in agriculture.** *J. For.* 55 (8), 1957 (563–6). 23 refs.

A brief general survey of the performance of exotics in Europe and S. America and, more particularly, Australia, New Zealand and S. Africa. Factors to be considered in introducing species are discussed.

264. MACDONALD, J. *et al.* **Exotic forest trees in Great Britain.** *Bull. For. Comm., Lond.* No. 30, 1957. pp. 168 + 17 plates. Many refs. (Seventh British Commonwealth Forestry Conference, Australia & New Zealand, 1957.)

After general chapters on climate, soils and silvicultural techniques, detailed notes are given on 37 coniferous and 22 broadleaved genera, including a number of individual species.

265. BROWN, J. M. B. **Ecology of Corsican Pine in Britain.** *Rep. For. Res. For. Comm., Lond. 1955/56*, 1957 (49–50).

Studies of the growth of Corsican Pine and the conditions under which it is growing in Britain are not yet complete, but have yielded useful information on the factors limiting its healthy growth in many places. Exposure to wind in particular renders it liable to attacks by the fungus *Brunchorstia destruens.*

266. SCULLY, G. **The case for Insignis Pine in Irish forestry.** *Irish For.* 15 (1), 1957 (39–49). 12 refs.

Gives the available data from a few trial plots and compares them with performance of *Pinus radiata* in New Zealand.

267. OEDEKOVEN, K. **European experiences with Douglas and other conifers from Western**

North America. *Irish For.* 15 (1), 1957 (12–31).
Deals with *Pseudotsuga taxifolia, Tsuga heterophylla* and *Picea sitchensis.*

268. SMEETS, J. G. P. M. En vergelijkend ecologisch onderzoek in opstanden van *Quercus borealis* Michx. en *Quercus robur* L. [**A comparative ecological study in stands of *Q. rubra* and *Q. robur*.**] Staatsdrukkerij Uitgeverijbedrijf, Netherlands. 1957. pp. 162. 7 pp. of refs. [Du.du.e.]
Discusses the natural range of *Q. rubra* (*a*), experience of growing it in Europe, and its economic significance, and describes studies on 7 sample plots in the Netherlands and 2 in Germany comparing it with *Q. robur* (*b*), and ecological studies in 11 stands of *Q. rubra.* Results include the following: Root development in the A_0 and A_1 layers, but not in the lower layers, was more intensive in (*a*); its main root system tended to develop horizontally, but that of (*b*) vertically. Litter of (*a*) decomposed more slowly, and had a higher C/N ratio, resin and wax content and crude fibre % than that of (*b*). Soil fauna and ground flora were usually poorer under (*a*). No significant difference was found between water requirements of the two species. Total yields of (*a*) are higher, and its rotation shorter, while the properties of its timber are adequate. It is concluded that (*a*) is very suitable for cultivation in the Netherlands on well drained moist sites and can also be grown successfully on poorer, drier soils. It should not be used for soil improvement on poor sites, or in attempts to maintain fertility on better ones. It should be sown, not planted, at a density of 12–15 hl. acorns/ha.

269. HACHENBERG, F. Misserfolge von Ausländeranbauten bei falscher Standortswahl. [**Failures with exotics tried on unsuitable sites.**] *Holz-Zbl.* 83 (99), 1957 (1211–2). 4 refs. [G.]
Of the species planted in Kastellaun district (Hunsrück) on badly aerated soils with a poor water regime, in the 1880's and 1890's, only *Pseudotsuga taxifolia* f. *viridis* did well. The others—*Carya ovata, Fraxinus pubescens, Picea sitchensis* and *Abies nordmanniana*—showed heavy losses (frost, snow) and poor growth.

270. JAHN, G. Über die Douglasie in Schleswig-Holstein. [**Douglas Fir in Schleswig-Holstein.**] *Allg. Forst- u. Jagdztg.* 128 (5/6), 1957 (118–24). 12 refs. [G.g.e.]
A general discussion of performance, which, though inferior to yields elsewhere in Germany, compares well with other conifers on similar sites. Crown damage by wind, affecting height and, presumably, diameter growth, is the most important adverse factor. Careful thinning can mitigate the damage. Resistance to windthrow is fairly good.

271. HBG.[HAUBERG], P. Robinie. [***Robinia pseudoacacia.***] *Dansk. Skovforen. Tidsskr.* 41 (2), 1956 (80–3). [Dan.]
Summarizes some Danish and German trials of Robinia.

272. HEIBERG, H. H. H. Fremmede bartrær i skogbruket på Østlandet. [**Exotic conifers in E. Norway.**] *Medd. norske Skogforsøksv.* 14 (No. 48), 1957 (187–200). 7 refs. [Nor.e.]
Discusses some of the important collections of exotics in Norway, concluding that *Larix decidua, L. sukaczewii* and, inland, *L. sibirica* give good results; they need fencing against cattle and deer, and there is no ready market for the timber.

273. STEFANSSON, E. Försök med olika barrträd vid Avardo och Muråsen i Frostviken. [**Trials with different conifers at Avardo and Muråsen in Frostviken.**] *Norrlands SkogsvFörb. Tidskr.* 1957 (2), (129–271). 3 pp. of refs. [Sw.sw.e.]
In studies to determine the possibilities of growing forest on the higher fells, 79 plots were established at Frostviken, 64° 30′ N., at altitudes of 1150–2370 ft., and planted in 1925–31 with 2-to 3-year seedlings of introduced and native conifers. Plots have been examined at intervals since 1948 and the trees measured in 1948 and 1953. The climate at Frostviken is compared with that native to each species studied, and the behaviour of each species during the test is discussed in detail. *Abies lasiocarpa* was the most promising; it did well in high exposed positions down to 1050 ft. *Larix sibirica* showed promise; *L. gmelini* var. *japonica* was insufficiently hardy, but survivors developed well; and *L. decidua* was unsatisfactory. Native *Picea abies* did well in sheltered positions; *P. glauca*, which grew rapidly at first and later more slowly, did not prove altogether wind-resistant. *Pinus contorta* var. *latifolia* was insufficiently hardy at ⩾ 1950 ft. while at 1350 ft. it grew well but proved susceptible to fungus attack and wind, possibly because of unsuitable provenances. *P. cembra* was badly damaged by elk but grew vigorously before the damage occurred. *P. sylvestris* was damaged by snow blight at higher levels but grew fairly well apart from damage by elk and snow pressure at 1460 ft. *P. mugo* was unsatisfactory. *Pseudotsuga taxifolia* var. *caesia* was very sensitive to snow pressure and was heavily attacked by *Phomopsis pseudotsugae.*

274. THORSTEINSSON, B. Lýsing trjátegunda, sem nú eru ræktaðar á Íslandi. [**Description of tree species grown in Iceland.**] *Ársr. Skogræktarf. Íslands* 1957 (5–43). 6 refs. [Ice.]
Covers some 35 species, including data on natural distribution, growth in Iceland, diseases, and uses of the wood.

275. PANIĆ, Đ. Neka zapažanja u vezi sa oblikom, zapreminom i prirastom američkog jasena. [**Observations on the form, volume and increment of *Fraxinus americana.***] *Šumarstvo* 10 (1/2), 1957 (37–62). 11 refs. [Serb.e.f.]
Data are given on the height, d.b.h., volume and increment of 20 felled trees from a 43-year-old stand of *F. americana* at Pančevo, Serbia, growing on a site subjected to occasional flooding. Comparison with yield tables for *F. excelsior* show that diam. increment and volume increment are small, particularly for the last 10 years, and low values are also obtained for the form factor. Further data are needed to determine the behaviour of *F. americana* on different sites.

276. LENARD, A. Šume eukaliptusa—najunosnije investicije savremenog šumarstva. **[Eucalypt forests—the most profitable investment in contemporary forestry.]** *Šumarstvo* 10 (1/2), 1957 (94–7). [Serb.e.f.]

The growth of Eucalypts is discussed and data are given on 10 Australian species recommended for introduction in Slovenia.

277. ENESCU, V., and FURNICA, H. O altă încercare de cultură de *Pinus banksiana* Lamb. în ocolul silvic Stalin. **[Another experimental plantation of *P. banksiana* in the Stalin Forest Circle [, Transylvania].]** *Rev. Pădurilor* 1957(8), (513–4). 3 refs. [Rum.]

Describes a small plantation now 50 years old: mean d.b.h. 24·1 cm., mean height 20·8 m. [Cf. *F.A.* 18 No. 1471.]

278. ENESCU, V., and CIOLAN, N. *Pseudotsuga taxifolia* Brit. în Ocolul silvic Stalin. **[*P. taxifolia* in the Stalin forest region [Rumania].]** *Rev. Pădurilor* 1956 (1), (15–22). 21 refs. [Rum.rum.russ.]

Data on increment and form of Douglas Fir (*viridis* type) growing in mixtures are compared with growth of Spruce and Beech on the same sites, and comparisons are made of climatic conditions in Rumania with those of the natural range of Douglas Fir.

279. RĂDULESCU, M. Contribuţii privitoare la cunoaşterea răspîndirii şi culturii bradului Douglas în ţara noastra. **[Distribution and growth of Douglas Fir in Rumania.]** *Rev. Pădurilor* 1956 (10), (649–51). 13 refs. [Rum.]

Summarizes the available data on trial plantings of Douglas Fir, indicating location, area, altitude and age of plantations, and mean d.b.h. and height.

280. **Provisional report on the exotic forest trees of Cyprus.** [Forest Department, Nicosia.] 1957. pp. 19. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

281. KAPLAN, J. **[The arboretum at Gilat [N. Negev].]** *La-Yaaran* 7 (3/4), 1957 (9–12, 40–39 + 1 photo). [Heb.e.]

In order to determine suitable species for planting on a large area of loess with 200 mm. annual rainfall, more than 150 species have been established since 1951 in groups of 15, spaced 2 × 4 m., with 5–6 irrigations in the first 2 seasons. The following show promise:—*Eucalyptus cladocalyx, E. gomphocephala, E. occidentalis, E. sideroxylon, Acacia pycnantha, A. karoo, A. decurrens, A. ciliata, A. pendula, Prosopis juliflora, P. glandulosa, Pinus halepensis, P. brutia, Cupressus arizonica, C. benthamii, C. lindleyi, Callitris propinqua, C. articulata* and *Argania spinosa* (very slow).

282. GAN, P. A. Opyt kul'tury berezy krivoj (*Betula procurva* Litw.). **[An experiment in growing *B. procurva*.]** *Bot. Ž.* 42 (4), 1957 (642). [Russ.]

B. procurva, which grows wild in Kirghizia, was raised from seed in an irrigated nursery at the Kirghiz forest experiment station. After 6 years the maximum height was 7·6 m. and maximum d.b.h. 10 cm. The species is recommended for introduction on irrigated lands in Central Asia.

283. HYODO, M., and SATAKE, K. **[On the *Acacia mollissima* Willd. in Kochi Prefecture.]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 92, 1956 (119–28). 7 refs. [Jap.e.]

Growth in a sheltered re-entrant showed a m.a.i. of 5·58 cu.m./ha. (910 trees) up to 10 years, and 7·08 cu.m. (692 trees) up to 15 years, wind and mortality being responsible for the loss. Rotations of 7 or 8 years are suggested. Broadleaved mixtures will be tried.

284. WYATT-SMITH, J. **A note on Teak in north-west Malaya.** *Malay. Forester* 20 (3), 1957 (129–39). 3 refs.

Gives data for the Langkawi plantation established in 1909, and 18 plantations established in 1949–55, with details of climate, soil, and nursery and planting techniques. Recommendations include: spacings of 12 × 12 or 12 × 16 ft., on light alluvial soil, use of stump plants rather than cuttings, and of Javan rather than Thailand stock, and burning to reduce competition.

285. ROSS, J. K.; MOSS, R. P. **Exotic forest trees in the Western Region of Nigeria. Some notes on the soils of the Western Region with special reference to plantations of exotic trees.** Government Printer, Ibadan. 1957. pp. 29 + 2 maps. 16 refs. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

Includes details on Teak and the limited data available on some 70 other exotics grown in the Region.

286. LAMB, K. M. **Exotic forest trees in the Southern Cameroons.** [Forest Department Southern Cameroons, Kumba, Nigeria.] 1957. pp. 7. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

An account of the progress made in growing plantations of *Eucalyptus grandis* for timber and fuel.

287. **Exotic forest trees in Uganda.** Uganda Forest Department, Entebbe. 1957. pp. 17 + 5 photos. 3 refs. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

288. PUDDEN, H. H. C. **Exotic forest trees in the Kenya highlands.** Government Printer, Nairobi. 1957. pp. 34. 18 refs. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

289. **Exotic forest trees in the British Commonwealth: Southern Rhodesia.** Government Printer, Salisbury. 1957. pp. 37. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

290. WILLAN, R. G. M., and MCQUEEN, D. R. **Exotic forest trees in the British Commonwealth: Nyasaland.** Department of Forestry, Nyasaland. 1957. pp. 14. 10 refs. in text. (Seventh British

Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

Reports on *Pinus elliottii*, *P. patula*, *Cupressus lindleyi*, *Cedrela toona* and *Eucalyptus saligna*, and lists the 110 exotics at present grown in Nyasaland.

291. POYNTON, R. J. **Notes on exotic forest trees in South Africa.** Government Printer, Pretoria. 1957. pp. 135 + map. Many refs. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

Part I gives a general account of climate, soils, techniques of establishment, thinning and pruning; Part II, detailed notes on species of major importance (*Acacia decurrens*, *A.d.* var. *mollissima*, 10 spp. of *Eucalyptus*, 10 sp. of *Pinus*, and *Populus deltoides*); Part III tabulates data on 240 species of minor importance.

292. HUNT, J., and DIMOCK, E. J. **Port-Orford-Cedar—a poor risk for reforestation.** *Res. Note Pacif. Nthwest. For. Range Exp. Sta.* No. 139, 1957. pp. 3. 2 refs.

Recent observations in Oregon and W. Washington have shown that stands of *Chamaecyparis lawsoniana*, which has been widely introduced, sustained heavy damage, with at times 100% mortality from (*a*) a cold spell in November 1955, and (*b*) a root disease caused by *Phytophthora lateralis*. This species is therefore not recommended for extensive introduction into areas outside its natural range.

293. LAMB, A. F. A. **Exotic forest trees in Trinidad and Tobago.** Government Printing Office, Trinidad, B.W.I. 1957. pp. 26. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

294. MATOS GONZÁLEZ, E. El eucalipto en Cuba y en el mundo. **[Eucalypts in Cuba and throughout the world.]** *Rev. agric., Habana* 39 (3), 1956 (68–73). 4 refs. [Span.] E.M.B.

General information on Eucalypts, with notes on their past history in Cuba and future possibilities there.

295. MANNING, W. E. **A Bolivian Walnut from Peru growing in Costa Rica.** *Brittonia, N.Y.* 9 (2), 1957 (131).

Identified as *Juglans boliviana*. The nuts, sown in Costa Rica in 1948, were collected in Peru.

296. COZZO, D. El crecimiento de *Araucaria angustifolia* en la provincia de Tucumán, Argentina. **[Growth of *A. angustifolia* in Tucumán province, Argentina.]** *Rev. for. argent.* 1 (3), 1957 (101–8). [Span.]

Studies of diameter and b.a. increment, based on growth-ring analysis, were made in 2 stands established by direct sowing (1) in 1942 in the region of Tucumán City and (2) in 1938 in Monte Bello, Departamento Rio Chico, on sites with very dissimilar climates and soils. The results from both stands were very similar and compared very unfavourably with growth data from stands in Misiones. Poor growth in Tucumán seems to be due to low and irregular rainfall.

297. HOUTTE, J. VAN. Nota sobre el crecimiento de *Pinus caribaea* y *P. taeda* en tierra firme de la provincia de Buenos Aires. **[The growth of *P. caribaea* and *P. taeda* on non-swampy soils in Buenos Aires province.]** *Rev. for. argent.* 1 (2), 1957 (65–6). [Span.]

Presents data on the development of stands. (1) 5 years 8 months old, and (2) 8½ years old.

298. SOROMAA, O. Algunos datos sobre el desarrollo del álamo en formación en los bosques de las zonas de Rengo y Parral. **[Data on the development of Poplar stands in the Rengo and Parral regions.]** *Chile maderero* 6 (2), 1956 (11–4). [Span.]

The Poplar plantations of Rengo and Parral were established for the match industry. Notes are presented on climate and soils, with data on increment and yield of normal stands.

299. KENNEDY, D. **The establishment, development, and regeneration of forests of exotic species [in New Zealand].** Government Printer, Wellington. 1957. pp. 12. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

300. BEDNALL, B. H. **Exotic forest trees in South Australia.** Government Printer, Adelaide. 1957. pp. 48. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

301. **Statement of exotic forest trees in Tasmania.** Tasmanian Forestry Commission, Hobart. 1957. pp. 6. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

302. WOOD, G. H. S. **Exotic forest trees in the British Commonwealth: report for North Borneo.** [Department of Forestry, Sandakan.] 1957. pp. 3. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

303. COTTLE, G. W. **Exotic forest trees in the British Commonwealth: Fiji.** Forestry Department, Fiji. 1957. pp. 20. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

232.12. Races and Provenance Trials

See also section 165 and Nos. 530, 1129.

304. FRÖHLICH, H. J. Züchtungsarbeiten im Lehrforstamt Gahrenberg. **[Tree breeding in the Gahrenberg instructional forest.]** *Forstarchiv* 28 (8/9), 1957 (170–5). 10 refs. [G.g.]

An account of provenance trials, set up ca. 30 years ago, of *Picea abies*, *P. sitchensis*, *P. engelmannii*, *Pseudotsuga taxifolia*, *Larix decidua*, *L. leptolepis*, *L. gmelinii* var. *coreana*, and *Pinus excelsa*. Some growth data are given and a brief note is included on current aims in breeding work.

305. EDWARDS, M. V. **Third report on an investigation of 1931–32 into various races of Larch.** *Rep. For. Res. For. Comm., Lond. 1955/56*, 1957 (142–54). 5 refs.

Summarizes the results of provenance trials in which 3 provenances of European Larch, (*a*)

Scottish, (*b*) Swiss Alpine, (*c*) Silesian were each planted on 3 different sites (1) good, (2) intermediate, (3) marginal. All provenances gave good survival on (1) and (2). Survival % on (3) was (*a*) 90, (*b*) 66 and (*c*) 80. Height differences were similar. No phenological differences between the provenances could be established, though there was a suggestion that (*b*) tended to flush earlier. It also suffered most from canker.

306. LINES, R. **Provenance studies.** *Rep. For. Res. For. Comm., Lond. 1955/56*, 1957 (40–2).

Southern coastal provenances of *Pinus contorta* proved more vigorous and hardier than northern coastal or inland provenances. Inland types were more seriously attacked by Pine sawfly than coastal ones. Provenance trials of *Larix decidua* laid down in 1952 on sites where previous crops had suffered severely from dieback, already show interesting results in the establishment stage. Polish provenances showed best growth and survival, with Sudeten generally second. Alpine provenances did worst.

307. HOUGH, A. F. **The Red Pine provenance test on the Kane Experimental Forest.** *Proc. 4th Ntheast. For. Tree Impr. Conf., Johnsonburg 1956*, 1957 (3–5).

Makes recommendations on seed sources of Red Pine for the Northern Allegheny Plateau. Results of tests after 10 years accord with those reported earlier [see *F.A.* 14 No. 1135].

308. **[Shortleaf Pine from different seed sources.]** *Rep. Sth. For. Exp. Sta. 1956*, 1957 (22–3).

Four-year-old Pine of 7 provenances planted in N. Mississippi, differed significantly in survival rates, but not in weight. Here, and in 2 Arkansas trials now in their third year, the progeny of seed from near-by sources did best.

232.13. Trials of Hybrids and Other Products of Tree Breeding

See section 165.

232.2. Preparatory Work. Auxiliary Measures

See also Nos. 379, 382–3, 409, 469, 488–90, 560–1, 564–8.

309. SLAVÍK, B. Několik ekologicko-mikroklimatických měření při zalesňování. **[Some ecological and microclimatic measurements in afforestation work.]** *Práce výzkum. Úst. lesn. ČSR* No. 6, 1954 (207–24). 8 refs. [Cz.cz.russ.g.]

Gives the results of measurements made on 8–9 July, 1952, on plots at Opočno, Czechoslovakia, on which soil-protecting and main tree species had been sown or planted. In furrow sowings, the furrow was found to form a frost hollow in which the minimum surface temperature at night was 2° C. lower than at its upper edges. Higher day temperatures above the furrow reduce the air humidity and soil moisture content and increase the transpiration of plants in it. Conditions on the (sunny) N.E. side of the furrow are less favourable than on the (shaded) S.W. side.

310. GREEN, A. W., and NEEBE, D. J. **Early development of Yellow Poplar on two planting sites.** *Sta. Note Cent. St. For. Exp. Sta.* No. 106, 1957. pp. 2.

In March 1954 fourteen $\frac{1}{10}$-acre plots were established on a forest site in S. Illinois with a dense cover of hardwood coppice, and 10 plots in an old field with sparse herbaceous vegetation. All plots were planted with seedlings of *Liriodendron tulipifera* at a spacing of 7 × 7 ft. After 2 growing seasons, survival was similar for both sites (ca. 80%), but seedling height on the hardwood site averaged 6·3 ft., and on the old field 1·5 ft.

311. **Site preparation aids survival.** *Rep. Sth. For. Exp. Sta. 1956*, 1957 (29).

In Central Louisiana, scalping the planting spot increased first-year survival of Loblolly Pine by 18% and Slash Pine by 7% but not that of Longleaf Pine. By attaching heavy scalpers to a standard Lowther tree-planter, scalping and planting were performed as one operation. The furrows cut were ca. 2 in. deep and 10 in. wide.

312. SCHNEIDER, H. W. **The Ottawa debris plow and scalper.** *Tree Plant. Notes* No. 28, 1957 (1–3).

Describes equipment devised at the Ottawa National Forest for use in front of a planting machine on ground encumbered with old stumps, logging debris etc., and with a heavy clay soil. It pushes aside all heavy debris, clearing a 6-ft. strip, excavates and pushes aside boulders up to 1·5 ft. diameter, and makes a continuous scalp 20 in. wide and 3 in. deep. Cost of materials is estimated at $180·00 and labour at 80 man-hours.

232.3. Seed, Nursery Practice, Direct Sowing

232.31. Seed

313. **Seed trials—*Maesopsis eminii*.** *Tech. Note For. Dep. Uganda* No. 5/57, 1957. pp. 2.

Reports on experiments to determine the best time for seed collection, pretreatment, depth of sowing, vermin control, germination period, germinative capacity and seed weight.

232.311. Seed Production (Seed Years, Seed Crops; Seed Orchards and Methods of Inducing Seed Production)

314. MORK, E. Om frøkvalitet og frøproduksjon hos furu i Hirkjølen. **[Seed quality and yield from Scots Pine in Hirkjølen.]** *Medd. norske Skogforsøksv.* 14 (No. 48), 1957 (349–79). 12 refs. [Nor.e.]

Twenty trees were selected in 1937 and their seed was examined over the next 10 years. The Hirkjølen experimental area lies ca. 61° 40′ N. and 10° 30′ E., and its lowest altitude is 725 m. Even in a warm summer, cones were not ripe till late Sept., and gathering should not start before Oct. The number of viable seeds may increase by 20% during Sept. After-ripening during storage at room temperature until April may double the % of viable seeds. After-ripening is no better if cones are left on the tree than if they are stored at outhouse temperature until April. Cone length is characteristic of individual trees, but cones will be longer in a warm season. The number of viable seeds varied between 28% from 5 very poor seed-trees to 70%

from 10 especially good ones. No connexion was found between age of tree or cone length and % of viable seeds and number of viable seeds per litre of cones. Fast-growing trees tended to have fewer viable seeds. Pine seeds in mountain forests need 310 growth units [see *F.A.* 14 No. 3177] in June–Sept., corresponding to a mean temperature of 10·5° C. for ripening, or 270 growth units after flowering.

315. WENGER, K. F. **Annual variation in the seed crops of Loblolly Pine.** *J. For.* 55 (8), 1957 (567–9). 8 refs.

Analysis of seed-crop records and climatic data over a period of 8 years showed that the seed production of 3 mature undisturbed stands of Loblolly Pine varied in direct relation to the May–July rainfall of 2 years earlier, and in inverse relation to the seed crop of 2 years earlier. Results suggest that increased soil moisture, (*a*) from irrigation, (*b*) from crown release, may be important in determining the seed production.

316. MANN, W. F., JR., and RUSSELL, T. E. **Longleaf cone production doubled by ringing.** *Tree Plant. Notes* No. 28, 1957 (6–7).

A study was begun in 1952 on open-grown *Pinus palustris*, d.b.h. 6–12 in. Ringing was done by cutting two half-circles through the cambium, on opposite sides of the bole, slightly above stump height, about 4 in. apart and overlapping by ca. 1 in. at each end. Incisions were ca. 1 in. wide and were made quickly with a bark hack of a kind used in resin-tapping. Three years after treatment, the larger ringed trees produced significantly more cones than unringed (120 and 51 respectively for 12-in., and 77 and 37 for 10-in. trees). Ringing was ineffective on trees < 10 in., probably because they were too small to bear cones abundantly. Seed tests showed that ringing had no effect on the number of sound seeds per cone or the germinability of the seed. Strangulation and treatment with 2,4-D had no effect on cone production.

317. GYSEL, L. W. **Acorn production on good, medium and poor Oak sites in southern Michigan.** *J. For.* 55 (8), 1957 (570–4). 9 refs.

A comparison was made for a 5-year period of the acorn production of 10–15 dominants and co-dominants of *Quercus rubra* and *Q. alba* on a good site, *Q. velutina* and *Q. alba* on a medium site and *Q. velutina* on a poor site. The acorn yield was estimated from seed-trap counts. The number of *Q. velutina* acorns was ca. twice that of *Q. rubra* but the latter weighed considerably more. The number and weight of *Q. alba* acorns was similar on medium and poor sites; the weight was $\frac{1}{5}$ that of *Q. rubra*. The % of sound acorns on the medium site was slightly higher than on the good site. In all stands most of the acorns were eaten by animals and insects. *Q. alba* and *Q. velutina* acorns were the preferred food of squirrels.

232.312. Seed Collection, Extraction and Grading (including Seed Weight)

See also Nos. 352, 493.

318. SEAL, D. **The supply of 'home-collected' conifer seeds in Scotland.** *Arbor, Aberdeen* 3 (1), 1957 (13–6).

319. BUSZEWICZ, G., and HOLMES, G. D. **Preliminary trials of a quick method for estimating the seed content of cones.** *Rep. For. Res. For. Comm., Lond. 1955/56*, 1957 (98–106). 3 refs.

[Cf. *F.A.* 18 No. 341.] Trials have been made with a method of judging the seed content by cutting sample cones lengthwise through the centre. This exposes a number of seeds in cross-section, which can be counted and related to the actual seed content of the cones. A special knife designed to cut cones accurately in half to facilitate seed counts is described and illustrated. Examination of the method for a number of samples of Scots Pine and Corsican Pine showed a good correlation of the average number of sound seeds visible on a cut cone with the number of sound seeds in the cones and the total weight of seed extracted. A provisional table is given for estimation of the likely yield of sound seed per bushel. It is proposed to check these conclusions for Scots Pine and Corsican Pine by further measurements, and the work will shortly be extended to other species with a view to development of a simple field procedure. *Author's summary.*

320. ALLEN, G. S. **Better handling of a scarce commodity.** *B.C. Lumberm.* 41 (7), 1957 (32 . . . 36). 7 refs.

Cones of Douglas Fir and Hemlock began to ripen in British Columbia about the 1st and 15th September respectively. Recommendations are to pre-cure until open, then dry at 122° F., tumble only briefly and gently, and screen off any debris (if considerable) before de-winging. Sound seed of these two species, so prepared, should give respectively 90 and 95% germination and keep at 32° F. for several years. Poorer germination in commercial seed is probably due to immaturity and to rough handling (accountable for 10–60% losses). Damaged seed may be recognized by its dull, darkened seed-coat.

321. EINSPAHR, D., and SCHLAFKE, D. **A method for Aspen and Cottonwood seed extraction.** *Tree Plant. Notes* No. 28, 1957 (10).

Describes a simple method, involving the use of a piece of cardboard tubing, 3 superimposed sieves, and a compressed-air line (illustrated).

322. STANESCU, C. Despre zvîntarea ghindei, densitatea şi influenţa sa asupra germinării. **[The drying and specific gravity of acorns, and their influence on germination.]** *Rev. Pădurilor* 1956 (1), (26–8). [Rum.rum.russ.]

The results of a number of observations on sp. gr. of acorns, lead to the following conclusions: (1) Sp. gr. is fairly constant for a given species and site, and at the time of falling from the tree varies from 1·16 to 1·32. (2) Sp. gr. increases, reaching a maximum at the time of germination; thereafter sp. gr. of acorn and plantule diminishes until it approximates to that of green wood. (3) If acorns are to be dried for storage, this natural process

must be borne in mind, and care taken not to exceed a 15% reduction of initial sp. gr.

232.315. Seed Storage and Treatment

See also Nos. 9, 69, 320, 322, 335, 381, 578.

323. LAMPRECHT, H. Estudios sobre la capacidad germinativa de las semillas de *Cedrela odorata* L. en relación con el método de almacenamiento. **[The germinative capacity of seed of *C. odorata* in relation to methods of storage.]** *Bol. Fac. Cienc. for. Univ. Los Andes* 3 (12), 1956 (40–61). 7 refs. [Span.e.g.]

Seed was stored: (1) in a stoppered jar in a refrigerator at + 5° C., (2) in an open jar + 5°, (3) in a stoppered jar exposed to ordinary conditions, (4) in paper bags exposed to ordinary conditions. The experiment lasted 14 months. Every 60 days a lot of 800 seeds (200 from each variant) was sown in the greenhouse. The most important results for the 4 treatments were respectively: (1) The initial germinative capacity was preserved throughout the experiment. (2) Germinative capacity was reduced only after 12 months. (3) Germinative capacity decreased rapidly after 4–6 months, and after 14 months was only ¼ of the original value. (4) Germinative capacity began to decrease after 4 and was completely lost after 10 months. *From author's summary.*

324. ZENTSCH, W. Erfahrungsaustausch 1957 über die Vorbehandlung von Forstsaatgut für die Aussaat in Tharandt. **[Experience in pretreatment of forest seed at Tharandt, 1957.]** *Forst u. Jagd* 7 (7), 1957 (323–5). [G.]

Makes recommendations on collection times, storage, water treatment, stratification etc. for seeds of Scots Pine, Spruce, Larch, Silver Fir, Douglas Fir, Weymouth Pine, Thuja and other conifers, and of Oak, Beech, Ash, Lime, Hornbeam, Maple, Birch, and other broadleaved species.

325. HOLMES, G. D., and BUSZEWICZ, G. **Forest tree seed investigations.** *Rep. For. Res. For. Comm., Lond. 1955/56*, 1957 (15–9).

Seed storage: Conifer seed stored dry for 5 years in sealed containers at 36° F. showed almost no fall in germinative capacity or energy. If the containers were stored at normal air temperatures in an unheated room, deterioration was rapid after the 4th year. *Seed pretreatment*: Moderately good germination (40%) of *Pinus peuce* could be obtained by stratification in moist peat at 36° F. for 8–12 weeks. *Tilia platyphyllos* seed, if extracted from the fruit, soaked in concentrated H_2SO_4, and then stratified in moist peat for 5 months, showed a substantial improvement in germinative power. *Biochemical testing*: The vital-staining method, using 2,3,5-triphenyl tetrazolium bromide has been approved by the International Seed Testing Association for use with slow-germinating species until methods of testing actual germination can be developed. The suggestion that misleading results may be obtained if attention is not paid to staining of the endosperm as well as the embryo [cf. *F.A.* 17 No. 3857] has not been confirmed in practice. The results of many hundreds of tests based entirely on embryo staining have shown consistently high correlation with the results of standard germination tests. *Germination tests of Beech nuts*: It has been found that Beech seeds germinate more rapidly in the laboratory at temperatures of 35°–40° than at the more usual germination test temperatures of 70°–85° F. *Seed moisture determination*: Tests with a grain-moisture hygrometer indicate that it gives accurate estimates of the m.c. of bulk seed at levels of moisture below 20%.

326. STONE, E. C. **Embryo dormancy of *Pinus jeffreyi* Murr. seed as affected by temperature, water uptake, stratification and seed coat.** *Plant Physiol.* 31 (2), 1957 (93–9). 23 refs. O.R.E.

Stratification reduced the time needed to reach 50% germination (here taken as the appearance of the radicle) from 23 to 3 days at 25° C., from 115 to 6 at 15°, and from 175 days to 50 at 5°. Removal of seed-coats and papery membranes from unstratified seeds reduced germination times to 4, 14, and 95 days respectively. Combination of both treatments had a cumulative effect, resulting in 50% germination in 10 days at 5°. At both 5° and 25° water uptake, rapid at first, slowed down after 48 hours. At 25°, germination started on the third day, at 5°, 75 days later. Each tissue making up the seed had a different pattern of water uptake. Differences between live and dead embryo and endosperm tissues suggest a combination of imbibitional and osmotic forces. Seeds soaked in water for 48 hours and kept at 5° for 3 months germinated about as well as seed stratified in a cool moist medium.

327. SIMAK, M., and GUSTAFSSON, Å. Experimentell förbättring av det norrländska tallfröets grobarhet. **[Experimental improvement of the germination of Pine seed from N. Sweden.]** *Skogen* 44 (16), 1957 (490–3). [Sw.e.]

Germination was considerably increased and plant quality improved by (*a*) stratification of the seed in sand at 4–5° C., or (*b*) 'equilibration' (treatment with an air stream of fixed humidity until moisture equilibrium is reached) of the seed at 100% relative air humidity and 4–5° C. X-ray photographs showed increased embryo lengths resulting from both treatments.

328. MIGITA, K., KAWANA, A., and TAKAHASHI, M. **Absorption of water by the seeds of the Japanese Red Pine (*Pinus densiflora*) in aqueous media with various concentrations of oxygen.** *J. Jap. For. Soc.* 38 (12), 1956 (465–6). 7 refs. [E.e.jap.]

Seeds were soaked in water to which H_2O_2 had been added to give oxygen concentrations of 100, 50, and 20 p.p.m. The concentration in the water used for controls was 8 p.p.m. Water absorption was determined by removing and weighing the seeds at increasing intervals of minutes and hours during the first day, and thereafter daily for 19 days. At all oxygen concentrations, water absorption rose rapidly and similarly in the first 1–2 days, and then slowed down; with the two higher concentrations, however, it again increased rapidly from the 8th day on. For the concentrations used, in descending order, germination began on the 9th, 10th, 13th and 14th days respectively. [Cf. *F.A.* 13 No. 1049.]

329. ASAKAWA, S. **[Germination of seeds of *Pinus densiflora* and *P. thunbergii* with special reference to temperature.]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 92, 1956 (1–18). 18 refs. [Jap.jap.e.*e.*]

Recommended pretreatment for *Pinus densiflora* (*a*) is 7–10 days at 2° C., and for *P. thunbergii* (*b*) 4 days at 25° followed by 4–6 days at 2°. Moderate moisture (a porous clay plate simulating nursery conditions) raised the germinative energy of pretreated (*b*), whereas an excess (wet filter paper) depressed it in both species, especially in (*a*). Pretreatment hastened and improved germination at a lower temperature. For long storage, even dry seed should be kept at a low temperature if possible. The seeds of (*a*) appear to germinate at a lower temperature than those of (*b*). Both, but especially (*a*), germinate better under 8 hours at 25° and 16 hours at 15°.

330. ASAKAWA, S. **[Studies on the delayed germination of *Fraxinus mandshurica* var. *japonica* seeds. (5). Effect of the compound stratification on germination.]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 95, 1957 (71–90). 22 refs. [Jap.jap.e.*e.*]

Seeds stratified for 6–7 months (1–4 at 25° C. and the remainder at 2°), were germinated at 25, 15 or 8° and in various alternations of these. Suitable (and shortest) stratification period with de-winged seed was 3 months warm, followed by 3 cold, both periods being essential. Such seeds germinate well with 8 hours at 25° and 16 hours at 8°. [Cf. *F.A.* 18 No. 3801.]

331. ACKERMAN, W. L. **After-ripening requirements for germination of seeds of *Acer truncatum* Bunge.** *Proc. Amer. Soc. hort. Sci.* 69, 1957 (570–3). 7 refs. E.M.B.

Stratification for 2 months in moist sand at 40° F. is beneficial to seed that has been kept dry at laboratory temperature (70° F.) for periods up to 4 months. Seed held in such storage for 1 year or longer gives best results without pre-germination treatment.

232.318. Seed Testing. Germination Tests. Seed Quality

See also No. 325.

332. EVRARD, R. L'analyse de la qualité des semences par la méthode aux rayons X. **[Testing seed quality by the X-ray method.]** *Ann. Gembl.* 63 (2), 1957 (81–93). 17 refs. [F.] A.P.B.

A summary of present knowledge based mainly upon Swedish findings.

333. NYHOLM, I. Spiringsundersøgelser af ædelgran *Abies alba.* **[Germination tests on *A. alba.*]** *Dansk Skovforen. Tidsskr.* 41 (3), 1956 (150–9). [Dan.dan.e.]

Describes with photographs a rapid test, in which seeds are soaked 1–3 days in tapwater, after which the excised embryos are kept on moist filter paper at room temperature for a few days, during which they develop and turn green.

334. BUSZEWICZ, G., and HOLMES, G. D. **Summary of five years' experience of seed testing for Larches.** *Rep. For. Res. For. Comm., Lond. 1955/56,* 1957 (106–13). 6 refs.

Describes the results of purity, weight, and germination tests for 360 samples of Larch seed examined during 1951–56 at the Alice Holt Seed Testing Laboratory. Results are compared for home-collected and imported seed of European and Japanese Larch, and home origins of hybrid Larch. Summary of seed-purity and weight determinations showed up appreciable differences between species and origins of seed. One of the most outstanding features was the high % of empty seeds in all species, which is a reflection of the difficulty in seed cleaning owing to the small difference in density between full and empty seeds. This point was especially evident for home-collected European and hybrid Larch. Germination tests showed that European and hybrid Larch germinate more rapidly under laboratory conditions than does Japanese Larch, and on the basis of the experience reported the following test conditions are recommended: European Larch: Copenhagen (Jacobsen) germinator at an alternating temperature 20–30° C. for 21 days. Hybrid Larch: as for European Larch, but continue for 28 days. Japanese Larch: as for European Larch, but 21 days' test preceded by moist pretreatment at 2° C. for 21 days. *From authors' summary.*

335. VARGA, D. Cîteva experienţe asupra seminţelor de *Gleditschia triacanthos* L. **[Some experiments on seed of *G. triacanthos.*]** *Rev. Pădurilor* 1957 (6), (382–6). 10 refs. [Rum.]

Recommends the following procedure for germination testing (combined with treatment against moulds). Seed to be washed in tapwater, scarified, soaked for 24 hours in a covered vessel containing a 1/100,000 solution of phenyl-mercury-borate, and then placed in the germinator without further washing. Temperature in germinator should be 25–28° C.

336. ENESCU, V., and ENESCU, V. Cîteva cercetări asupra germinaţiei seminţelor de ulm. **[Some studies on the germination of Elm seed.]** *Rev. Pădurilor* 1957 (4), (230–5). 20 refs. [Rum. russ.g.].

Reports studies on *Ulmus laevis, U. glabra,* and *U. carpinifolia* (germinative capacity and germinative energy, in relation to m.c. of seed and of medium).

337. VYSKOT, M. Vzcházivost naklíčených bukvic s porušeným a ulomeným klíčkem a životnost bukových semenáčků. **[The viability of pre-germinated Beech seed with damaged or broken radicles and the survival of the resulting seedlings.]** *Práce výzkum. Úst. lesn. ČSR* No. 6, 1954 (79–100). 21 refs. [Cz.cz.russ.g.]

Three plots of 0·5 sq. m. were each sown on 30 March with 1 kg. of germinating Beech seed (ca. 2350 seeds) which was undamaged (*a*) or had half (*b*) or the whole (*c*) of the radicle broken off. The seedlings were attacked by *Phytophthora omnivora* in May; they were lifted on 30 Nov., and their height, root length and number of buds determined. The results were evaluated statistically. It was found

that 19% of (*a*), 14% of (*b*), and 12% of (*c*) had come up: (*c*) showed the highest survival (15%), (*a*) less (12%), and of (*b*) only 7% had survived. The (*c*) seedlings were largest; those from (*b*) were small, and had no taproot.

232.32. Plant Rearing. Nursery Practice

338. STOECKELER, J. H., and JONES, G. W. **Forest nursery practice in the Lake States.** *Agric. Handb. U.S. Dep. Agric.* No. 110, 1957. pp. 124. 193 refs.

Presents the results of experience from large-scale planting which began in the 1930's. Emphasis is on the production of 1- to 4-year-old nursery stock grown from seed and suitable for afforestation purposes.

339. BØRTH, L. Planteskolekurset i Lyngdal 3.-6. Juli 1956. **[A nursery course at Lyngdal, 3–6 July, 1956.]** *Årsskr. norske Skogplantesk. 1956*, 1957 (16 . . . 145). [Nor.]

Contains the following papers, with discussion: The use of exotics in S. and E. Norway (*O. Børset*); The [nursery] production of plants of individual exotics (*G. Hiorth*); and The use of fertilizers on *Picea abies* in the Sønsterud nursery (*M. Sandvik*).

340. BELGARD and PROFITTLICH. Der Nachweis der Wirtschaftlichkeit bei der eigenen Forstpflanzenanzucht. **[Cost accounting and profitability of forest department nurseries.]** *Forst- u. Holzw.* 12 (15), 1957 (249–53). 6 refs. [G.g.]

Discusses methods of cost accounting by species, with illustrations from a nursery in the Eifel, where, at the present level of wages, mechanization etc., Spruce and Douglas Fir could be raised from seed far more cheaply than they could be bought from commercial nurserymen.

232.322. Preparation and Treatment of Soil, including Maintenance of Fertility

See also Nos. 377, 580, 593.

341. GÜNTHER, H., and MORGENEYER, W. Lupinenvoranbau in Pappelmuttergärten. **[Soil preparation with lupins in Poplar stool-beds.]** *Forst u. Jagd* 6 (4), 1956 (180–2). [G.]

Several methods of site preparation were tested before planting *Populus* × *berolinensis* cuttings on a light sandy soil: yellow lupin was sown, cut when full grown and either (*a*) removed or (*b*) left to dry on the ground, ploughing being subsequently done to a depth of (1) 20 cm. or (2) 10 cm. Mean height of Poplar at the end of the first growing season, for the different treatments was: (1) (*a*) 120·3 cm., (1) (*b*) 127·7 cm., (2) (*b*) 84·3 cm. [no (2) (*a*)], and controls 95·8 cm. Treatment (2) (*b*), however, gave increased growth in the 2nd year (25% more than controls). Rooting was > 95% in all cases. Other legumes tested gave inferior results to lupin.

342. FAULKNER, R., and ALDHOUS, J. R. **Nursery investigations.** *Rep. For. Res. For. Comm., Lond. 1955/56*, 1957 (19–35).

Partial sterilization: Work has been concentrated on trying to find alternative methods to the standard formalin drench treatment, that are easier to apply and cheaper. Applications of undiluted formalin as a surface spray proved rather less satisfactory. Chloropicrin injected into the soil frequently gave better results than the formalin drench, but was more expensive. Shell 'C.B.P.-55' gave even more promising initial results but was difficult to obtain. Autumn sterilization, by any method, was never inferior, and sometimes superior, to spring sterilization. *Seedbed covering*: Covering to a depth of $\frac{3}{16}$ in. gave best results with Sitka Spruce and *Tsuga heterophylla*, but *Abies procera* and *A. lowiana* did best with $\frac{1}{2}$–$\frac{3}{4}$ in., thinner layers producing markedly inferior results. Further trials are necessary before confident recommendations can be made on depth of cover for *Abies* seedbeds. In tests with different colours of grit for seedbed covering, it was found that temperatures under dark grits were up to 10° F. higher than under white grits. *Seedbed irrigation*: During the dry summer of 1955, overhead sprayline irrigation produced seedlings > 50% taller than those in unirrigated beds, but there was no appreciable difference in survival. *Summer shading of seedbeds*: The hot, dry summer of 1955 provided excellent conditions for testing the effect of covering seedbeds with lath shelters. This was done in an experiment whenever the maximum screen temperature exceeded 70° F. for two consecutive days, and showed that there was no difference in survival or growth between the shaded and unshaded beds of the species under test, namely Japanese Larch, Douglas Fir, Norway Spruce, Lodgepole Pine, and *Abies* spp. This suggests that, for these species, the expense of summer shading may not be justified. *Handling and storage of plants*: Wrapping bundles of plants in polythene sheet was the best of a number of protective treatments, and the only one that resulted in 100% survival on planting after 20 days. Survival was closely related to the moisture content of the plant. In practice, polythene bags are easier to use than polythene sheet.

343. GRIFFIN, D. M. **Fungal damage to roots of Sitka Spruce seedlings in forest nurseries.** *Rep. For. Res. For. Comm., Lond. 1955/56*, 1957 (86–7).

Investigation of root systems of Sitka Spruce and other conifer seedlings in soil-sick nurseries before and after partial sterilization, indicate that damage by fungal pathogens is insufficient to account for the poor growth of seedlings in such nurseries. It seems likely that much of the beneficial effect of partial sterilization is due to changes in the amount and nature of available N.

344. MOLIN, N. L., and TEÄR, J. I. Om jordesinfektion i skogplanteskolor. **[Disinfecting the soil in forest nurseries.]** *Årsskr. norske Skogplantesk. 1956*, 1957 (147–55). 15 refs. [Sw.]

Seedbeds were treated in spring with the following chemicals separately or in combination, ca. 10 days before sowing with Pine or Spruce: methyl bromide, formalin, allyl alcohol, and ethylene dibromide. Results by August showed that in the majority of treated plots the number of plants was higher than on the controls; for both species, plots treated with allyl alcohol showed the highest number of plants. For a number of treatments, measurements of shoot

and root growth showed a significant increase over the controls. The root/shoot ratio of Spruce was higher on the treated plots than on the controls. MeBr controlled weeds almost completely; all plots showed a reduction in weeds compared with controls, but *Equisetum arvense* proved resistant to most of the chemicals except MeBr. Further research is needed. [Cf. *F.A.* 17 Nos. 1491–3, 2717; 18 No. 1530.]

345. SALISBURY, P. J. **A test of three disinfectants in nursery soil.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 13 (3), 1957 (3–4).

Small-scale trials of CBP (chlorobromopropene), AA (allyl alcohol), and Mylone (dimethyl tetrahydrothiazine) applied to nursery soil 2 weeks before sowing with Douglas Fir, gave no information on their effect in preventing damping off, which was low all over the area. All three reduced weed growth, though not significantly. Further tests are to be made, since Douglas Fir is sensitive to post-emergence application of selective weedkillers.

346. SHIBAMOTO, T. **Fertilizing forest land.** Nitrogen Division, Allied Chemical and Dye Corporation, New York. 1957. pp. 35. Transl. from a publication of the Forest and Estate Mutual Foundation, Tokyo.

Contains sections on: the need for fertilizer application; development and productivity of forest soil; the purpose of fertilizing; kind of fertilizer required; economic results; and properties and use of solid fertilizers in forestry. There are tables, chiefly relating to the more important Japanese species, including *Cryptomeria japonica*, *Chamaecyparis obtusa*, *Pinus densiflora* and *Larix leptolepis*, showing amounts of fertilizer usually required in afforestation, amounts needed on poor soils, average expenditure and income with *Cryptomeria* afforestation, profits from the use of fertilizers at various rates of interest and land prices, solid fertilizers of different types and their uses in forestry, use of fertilizer granules in nurseries, standard applications in afforestation and some examples of effects on growth and value.

347. RICHARD, F., and CHAUSSON, J. S. Über die künstliche Veränderung physikalischer Bodenfaktoren. **[Artificial modification of physical soil properties.]** *Mitt. schweiz. Anst. forstl. Versuchsw.* 33 (1), 1957. pp. 31. 7 refs. [G.g.f.it.e.]

Describes laboratory experiments on the effect of Krilium on pore-size distribution, size of water-stable aggregates and saturated permeability of 4 clay or silt soils, showing beneficial effects of small concentrations (0·1%) on neutral clay soils only. [Cf. *F.A.* 17 No. 3861.]

232.323. Sowing and Covering

See also Nos. 337, 342, 377.

348. LENCZEWSKI, K. Nowy siewnik sitowy. **[A new screen-type sowing device.]** *Las Polski* 31 (4), 1957 (17). [Pol.]

Illustrated description of a device weighing 8 kg., invented by H. Łozinski, consisting of a wooden box with two wooden screens 100 × 7 cm. (thickness ca. 1·5 cm.) in the bottom, each having 100 holes of 1·2 cm. diam. arranged in quincunx and staggered by ca. 1·2 cm. Between these two screens is inserted a metal screen 3 mm. thick, with elliptical 3 × 5 mm. holes; this screen can be moved backward and forward by handles, so allowing seeds to pass through to the soil. The seeds fall uniformly along the drill (7 × 100 cm.). The seed is said to be undamaged. Sowing density can be controlled by adjustment of the top wooden screen.

349. LIU, L., and CHIANG, W. Y. **Preliminary study of the raising of *Salix matsudana*.]** *For. Sci., Peking* 1 (1), 1955 (91–7). [Chin.chin.]

The seed is best collected when the capsule is yellow-brown and the tip about to split. It should be dried for 1–2 days in the sun, then sown, barely covered, in a shady bed, and watered daily. 92% germination was obtained in ca. 17 hours. Slight nematode and fungal attack occurred. Seedling size at 10 months is tabulated. Seed sown without its hairs did not develop so well.

350. GRIFFITH, A. L. **Date of sowing.** *Rep. E. Afr. Agric. For. Res. Organ. 1955/56*, [1957] (58–9).

Experiments showed a drop of nearly 50% in first year's height growth between sowings made before and after the long rains; this was most marked in *Pinus patula*. With *Cupressus lusitanica* and *Pinus radiata* mean height growths of 12–14 in. and 12–13 in. respectively can be obtained with post-long-rains sowings, but only 8–11 in. can be obtained even with pre-long-rains sowings of *P. patula*.

351. DELONG, T. S., and NOLDER, C. R. **Pine needles for seedbed covering.** *Tree Plant. Notes* No. 29, 1957 (10–11).

Seedbeds covered with ½ in. of Pine needles followed by ½ in. of mixed sand and sawdust (*a*), were compared with beds covered by ½ in. of sand and sawdust over which was placed a layer of burlap removed after germination (*b*). Plants/sq. ft. on (*a*) were 64·9, on (*b*) 37·7, height and diam. were slightly superior on (*a*), and plants with bent stems only 3·5% compared with 18% on (*b*). Other advantages are reduced erosion of beds, and saving of cost of removing covering. Frost-heaving was also reduced.

352. PURCELEAN, Ş. Influenţa mărimii seminţelor si a adîncimii de semănare asupra creşterii puieţilor de nuc negru (*Juglans nigra* L.). **[The influence of size of seed and depth of sowing on the development of *J. nigra* seedlings.]** *Rev. Pădurilor* 1956 (12), (812–4). 3 refs. [Rum.]

Sowings at each of 3 depths (4, 8, and 12 cm.) were made with 100 nuts of each of 3 sizes (small, medium, and large). Best germination was obtained with 8 cm., and the largest and most vigorous plants from the large nuts.

353. FAULKNER, R. **Experiments on seedbed compaction.** *Rep. For. Res. For. Comm., Lond. 1955/56*, 1957 (113–23). 7 refs.

Experiments were made to determine the effect of various degrees of seedbed compaction, before and after sowing, on height growth and total yield of seedlings. Sitka Spruce was used in all tests. The

results indicate that compaction before sowing with a roller of 12-in. diameter weighing ca. 2 cwt. is the most satisfactory method and gives maximum yield of seedlings. Compaction hastens germination but does not greatly affect height growth. Slightly firming the seed into the seed-bed surface, and rolling after applying grit covers, have little effect on growth and yield of seedlings. Heavy rollers (> 300 cwt.) in some cases caused a reduction in yields.

232.324. Transplanting and Lining Out, including Grading of Seedlings.

See also Nos. 86, 469.

354. GRIFFITH, A. L. **Effect of time between germination and pricking out on subsequent growth and survival.** *Rep. E. Afr. Agric. For. Res. Organ. 1955/56*, [1957] (59).

Seedlings of *Cupressus lusitanica*, *Pinus radiata* and *Eucalyptus saligna* were pricked out from the same beds at weekly intervals for 14 weeks. With *E. saligna* and *P. radiata* best results were obtained with plants pricked out one week after germination, with *C. lusitanica* 1–3 weeks. In general, the longer the delay, the greater the check and the poorer the subsequent growth.

355. HEINTZ, R. H. **Design for a nursery seedbed lifter.** *Tree Plant. Notes* No. 29, 1957 (3–7).

Describes, with photographs and scale drawings, a machine for lifting nursery stock designed at the N. Dakota State Forest Nursery.

356. DAY, M. W. **A convenient tree lifter.** *Tree Plant. Notes* No. 29, 1957 (8–9).

Describes, with photographs and scale drawings, a machine for lifting nursery stock designed at Dunbar Forest Experiment Station, Sault Ste. Marie, Mich.

232.325. Tending (in both Seedbeds and Transplant Beds)

See also Nos. 342, 344–5.

357. SAMSET, I. Skogforsøksvesenets lukefres for skogplanteskoler. **[The Skogforsøksvesen's rotary weeder for forest nurseries.]** *Årsskr. norske Skogplantesk. 1956*, 1957 (163–5). [Nor.]

A mechanical weeder [illustrated] was designed for use with a Ferguson tractor; it consisted of 6 rotary cutters, spaced to conform with seed or transplant rows, and was powered by a motor-saw motor (700 rev./min.). Each cutter was fitted with a cover to protect the seedlings and was mounted independently. Weeds were cut to a depth of 1½ cm. The weeder, used with a crew of 2, one to drive the tractor and the other to steer the weeder, was very satisfactory in the seedbeds, weeding ca. 70,000 linear metres in 61 working hours; rows in the transplant beds were too unevenly spaced for its successful use there.

358. ROWE-DUTTON, P. **The mulching of vegetables.** *Tech. Commun. Bur. Hort. Plantat. Crops, E. Malling* No. 24, 1957. pp. xiv + 169 + 9 photos. 17 pp. of refs. Price 20*s*.

A review of the literature, including much material on the use of sawdust mulches.

359. GRIFFITH, A. L. **Effect of restricting evaporation. Transplant boxes.** *Rep. E. Afr. Agric. For. Res. Organ. 1955/56*, [1957] (60).

An experiment was carried out in which boxes were (*a*) sunk to ground level, (*b*) placed normally on a ground base, and (*c*) as (*b*) but mulched with chopped straw for the dry season. Results showed that (*a*) and (*c*) increased growth of *Pinus radiata* by 8% and 2% and of *P. patula* by 36% and 10% respectively. Treatment (*a*) is, however, expensive, as the boxes have to be dug up frequently for pruning of roots that have grown through the bottom of the boxes, and wear and tear and termite damage to boxes are considerable.

232.326. Salvage of Overgrown Seedlings and Transplants. Root or Shoot Pruning etc.

360. **[Root-pruning of Longleaf Pine.]** *Rep. Sth. For. Exp. Sta. 1956*, 1957 (29).

First-year survival of plants root-pruned < 3 months before lifting, was 92–100%, according to time and frequency of pruning, compared with 66% for plants root-pruned after lifting.

232.327. Protection Measures in Nurseries

See also Nos. 342–5, 359, 576–81.

361. REINES, M., and GREENE, J. T. **Screening for seedbed protection against birds.** *Tree Plant. Notes* No. 29, 1957 (12–3).

Describes wooden frames covered with fibreglass screening, that fit over seedbeds and protect them from birds during the early stages of germination, and can be raised later to serve as shading. Watering can be done through the screens, which reduce the eroding effect of water.

232.328. Vegetative Propagation

See also Nos. 76, 113–4, 341.

362. HATCHER, E. S. J., and GARNER, R. J. **Aspects of rootstock propagation. IV. The winter storage of hardwood cuttings.** *Rep. E. Malling Res. Sta. 1955/56*, 1957 (101–6 + 2 plates).

363. BEAN, G., TRICKETT, E. S., and WELLS, D. A. **Automatic mist control equipment for the rooting of cuttings.** *Journal of Agricultural Engineering Research, Silsoe* 2 (1), 1957 (44–8). 6 refs. O.R.E.

Describes an improved installation, particularly an improved artificial leaf for controlling the mist supply.

364. SHIDEI, T., and OGASAWARA, K. **[Studies on the cuttings of forest trees. (IV). Influence of amount of needle, hormone treatment and their interaction on the rooting behaviour of cuttings of *Metasequoia glyptostroboides*.]** *J. Jap. For. Soc.* 39 (6), 1957 (221–4). 9 refs. [Jap.jap.e.*e*.]

Trials with cuttings 1½ nodes (6 cm.) long, with 2 intact upper shoots (*a*) or with ¾ of each of these shoots removed (*b*), showed that (*b*) were inferior in speed and amount of root development. Treatment

with indole-3-acetic acid was adverse, probably owing to incorrect concentration. Cuttings decayed if all shoots were removed.

365. HYUN, S. B., and KIM, K. B. **[Studies on the cuttings of genus *Pinus*. (1) The effects of season of collection and growth substances on the rooting of cuttings of *Pinus rigida*.]** *Coll. Theseon (Sci. nat.) Univ. seoul.* No. 3, 1956 (35–48). 32 refs. [Kor.e.]

Results varied with both date and type of growth regulator. Generally the number of rooted cuttings was greater for the earlier dates of taking cuttings. Cuttings failed to root, irrespective of time of planting, unless treated with a growth regulator. *From authors' summary.*

366. NELSON, T. C., and MARTINDALE, D. L. **Rooting American Sycamore cuttings.** *J. For.* 55 (7), 1957 (532).

Cuttings, 20 in. long, from 1-year-old stool shoots of *Platanus occidentalis* rooted successfully and showed an average height growth of 5·1 ft. at the end of the first growing season. The survival and height growth of cuttings with a diam. of $\geqslant \frac{1}{2}$ in. was better than that of smaller cuttings. There was no significant difference in survival and growth between spring and autumn plantings.

367. HUSE, S. Degenerasjon ved klonformering. **[Degeneration of clones.]** *Norsk Skogbr.* 3 (15), 1957 (397–8, 403). [Nor.e.]

Summarizes an article by Rohmeder [see *F.A.* 18 No. 3990] and discusses the applicability of his conclusions to Aspen and Oak in Norway.

368. **[Rooting of Cottonwood cuttings.]** *Rep. Sth. For. Exp. Sta. 1956*, 1957 (24).

Cuttings from the current-year top of mature trees rooted less well than cuttings from the current-year top of plants recently raised from seed. Only 32% of cuttings taken from previously rooted topwood cuttings struck roots, compared with 55% from stools of more recent seedling origin. Auxin did not improve rooting ability of either type.

369. SHIDEI, T., and OGASAWARA, K. **[Studies on the cuttings of forest trees (II). The effect of the hormone treatment on the rooting behaviour of the cuttings of Poplar (*P. nigra* var. *italica*).]** *J. Jap. For. Soc.* 39 (4), 1957 (124–7). 13 refs. [Jap.jap.e.*e.*]

Reports on water-culture experiments on cuttings treated with indole-3-acetic acid in lanolin paste. Callus development varied little, but controls showed rather more callus than treated cuttings, and unrooted cuttings more than rooted. Rooting began after ca. 5 days, regardless of treatment. The growth regulator increased the number of roots and total root length per cutting, but its effects depended greatly on the season at which cuttings were collected.

370. GILLOT, J.; DUBOIS, L. [1] Multiplication végétative du *Rauwolfia vomitoria*. [2] Plantes à réserpine. **[[1] Vegetative reproduction of *R. vomitoria*. [2] Plants containing reserpine.]** *Bull. agric. Congo belge* 48 (3), 1957 (770–2). [F.]

[1] Details of successful trials covering type of cutting, ground preparation, spacing, planting, cleaning, yield, and effect of cutting back. [2] Gives tabulated figures of reserpine % in 11 *Rauwolfia* spp. and lists 5 Apocynaceae, mainly trees, containing no significant amounts.

371. KAWANA, A., FUJIMOTO, Y., and DOI, M. **[Air-layering of Japanese Red Pine (*Pinus densiflora*).]** *J. Jap. For. Soc.* 38 (11), 1956 (433–4). 7 refs. [Jap.jap.e.]

Mergen's method [see *F.A.* 16 No. 4026] was applied on twenty 13-year-old plants on 18 June. First roots were formed on 19 Aug. Treatment with α-naphthalene acetic acid resulted in 5 (4) rooting, 11 (6) callusing and 4 (10) dying, the numbers in brackets being the results for untreated controls. Rooted cuttings have continued to grow on planting. Root primordia originated in the callus.

372. **[Grafting Slash Pine.]** *Rep. Sth. For. Exp. Sta. 1956*, 1957 (23).

Succulent scions of Slash Pine were grafted on Slash Pine rootstocks. Treatment with a fertilizer containing 5% N, 10% P and 5% K significantly increased the survival of grafts. Addition of Pine mulch to fertilized grafts was also beneficial. Survival of grafts varied greatly with the parent tree of the scions.

373. SEVEROVA, A. I. Privivki kedra sibirskogo na sosne obyknovennoj. **[Grafting *Pinus sibirica* on *P. sylvestris*.]** *Priroda, Moskva* 46 (6), 1957 (88–90). [Russ.] A.P.B.

Recommendations are made, based on many years' experience, on the preparation of the stock and scion, the technique of grafting, and tending of the grafts.

374. HOFFMANN, K. Freilandssommerpropfungen mit Nadelhölzern. **[Grafting conifers in the open during the summer.]** *Forst u. Jagd* 7 (5), 1957 (202–3). [G.g.]

In tests with Pine, Spruce, Douglas Fir and Larch, using scions cut the same day, best results, exceeding those of spring graftings with stored scions, were obtained from July to September. Warm, dry weather was favourable.

375. KLEINSCHMIT, R. Anzucht von Pfropflingen einiger Baumarten im Warmhaus unter Verwendung von Kunstlicht. **[Cultivating grafts of various species in a greenhouse, using artificial light.]** *Forstarchiv* 28 (8/9), 1957 (176–8). 11 refs. [G.g.]

Grafts of *Pinus sylvestris*, *Picea abies*, *Abies alba*, *A. grandis* and *Pseudotsuga taxifolia* were made in a greenhouse on 3- to 4-year-old stocks. From December 1954 the daylight was supplemented from 6 to 9 a.m. and from 4 to 7 p.m. by artificial lighting of 1000 lux. For the last 4 species flushing took place 2–9 days earlier, needles were darker and shoots were longer than on control plants in an unlighted part of the greenhouse. *P. sylvestris* showed less response, but the % of successful grafts was 10% higher than for the controls, and more than for any other species. The length of flushing period remained the same for both treatments except in *A. grandis*. Similar experiments were made in 1955/6 with *Fagus sylvatica*, when flushing took place 10 days earlier in plants receiving extra light.

When planted out after one year in the field these plants flushed 4 weeks earlier than adjacent naturally regenerated Beech. Observations will be continued.

376. NELSON, T. C. **A method for vegetatively propagating Yellow-Poplar.** *J. For.* 55 (8), 1957 (589). 3 refs.

Outlines a method whereby seedlings of *Liriodendron tulipifera* are split longitudinally along their entire length, the exposed root and stem tissues are coated with lanolin, and the seedling halves are transplanted. After transplanting, the upper half of the stem is clipped to induce growth of buds at the root collar. This method was tried successfully on 20 seedlings: it can only be used on stock small enough to transplant.

232.329. Miscellaneous (including Greenhouses, Frames, Raising in Pots, Tubes etc.)

See also Nos. 390, 1074.

377. EDWARDS, C. **A convenient method of raising *Eucalyptus* from seed.** *Aust. For.* 20 (2), 1956 (102–3 + plate).

An experiment on the population genetics of *E. urnigera* required the raising of 3500 seedlings. Seed was germinated in Petri dishes and, as the cotyledons were escaping from the testa, the seedlings were pricked out directly into veneer tubes filled with compost, the tubes packed into boxes of 100, and each 6 boxes placed in a galvanized iron tray 4 ft. square by 4 in. deep. The trays were placed in the open, and glass covered with muslin was supported 1 ft. above the boxes to protect the seedlings from heavy rain. The seedlings were watered with a very fine hose, and in very hot weather the trays were flooded to a depth of 3 in. Seedlings produced 4 pairs of leaves and reached a height of 2–3 in. in 2 months, but growth then stopped, and no response was obtained to K or P. Applications of $(NH_4)_2SO_4$ or $NaNO_3$ started growth again, but also caused 50% mortality. Synthetic urea was then tried as a source of N, both as a foliar spray and by adding it to the water in the trays, and either method started a rapid and healthy growth, the plants growing to a height of 12–18 in. in 4 months. Bottom watering gave the better results. Urea was used at ½ oz./gal. for overhead watering and half that strength for the solution in the trays. The method has also been used to raise *E. unialata*, *E. lehmanni*, *E. regnans*, *E. obliqua*, *E. polybracteata* and *E. staigeriana*.

378. NELSON, T. C. **Early responses of some southern tree species to gibberellic acid.** *J. For.* 55 (7), 1957 (518–20). 6 refs.

A 1% solution of gibberellic acid in lanolin was applied to young stems of 11 tree species grown in pots. There were 8 replicates of 1 treated and 1 untreated plant for each species. The period of observation varied from 23 to 70 days. Treatment significantly increased the height growth of *Populus deltoides*, *Platanus occidentalis*, *Liriodendron tulipifera*, *Liquidambar styraciflua*, *Quercus falcata*, *Q.f.* var. *pagodaefolia* and *Q. phellos*. The increase in height growth was less significant for *Q. alba* and *Pinus strobus*. *Q. nigra* and *Cupressus arizonica* exhibited no consistent increase. [Cf. *F.A.* 18 No. 1293.]

232.33. Formation of Stands by Direct Sowing

See also Nos. 403, 481.

379. **[Direct sowing of *Pinus patula*.]** *Rep. S. Rhod. For. Comm. 1955/56*, [n.d.] (9).

In order to determine whether poor stands of *Pinus radiata* can be successfully converted to *P. patula*, spot and broadcast sowing on prepared and unprepared ground in burnt and unburnt brush areas were carried out. Best results were obtained when *P. patula* seeds were sown broadcast at 3½ lb./acre on patches where brushwood had been recently burnt.

380. HOLMES, G. D. **Chemical repellents for protection of direct sown seeds.** *Rep. For. Res. For. Comm., Lond. 1955/56*, 1957 (48).

Application of a bitumen spray to direct-sown patches of *Pinus radiata* and *P. pinaster* offered little obstacle to attack by *Apodemus sylvaticus*, but covering the seed with coarse grit followed by a bitumen spray, gave a high measure of protection. [Cf. *F.A.* 19 No. 400.]

381. ROY, D. F. **Seed spot tests with tetramine-treated seed in northern California.** *J. For.* 55 (6), 1957 (442–5). 5 refs.

[Cf. *F.A.* 17 No. 580; 18 No. 2783.] Confirms the findings of previous experiments on germination and protection from rodents of Ponderosa Pine and Douglas Fir seed treated with acetone/tetramine solution. In further experiments with Ponderosa Pine seed, coating with a 10% yellow dextrin solution containing tetramine (10 mg./g. of seed) failed to protect the seed against rodents, and, contrary to earlier findings, inhibited germination.

382. CHILCOTE, W. **Getting growth on south slopes. Using mustard as a nurse crop.** *Timberman* 58 (8), 1957 (56, 58).

Research over a period of 4 years has established the beneficial effect of a cover crop of brown mustard (*Brassica juncea*) on direct sowings of Douglas Fir on burnt-over slopes in Oregon. The recommended technique is to sow mustard from a helicopter at 3–5 lb./acre in the autumn after a fire; Douglas Fir seed of suitable provenance, treated with a rodent repellent, should also be sown from the air at 3 lb./acre in the same autumn or winter. The mustard germinates in a few days and effectively prevents erosion; it should be sprayed in early spring, before it is in full bloom and before the rains cease, with 2,4-D at ½ or ¾ lb./acre in water solution. Costs have not been worked out, but it is believed that the work, including spraying with 2,4-D, cost of seed, sowing etc. will be substantially less than hand planting with 2 + 0 Douglas Fir nursery stock.

The results of experiments on exposed burnt-over slopes showed that ca. 3 times as many Douglas Fir seedlings germinated and began to grow under a nurse crop of mustard as on a bare plot; surface soil temperature under mustard was reduced by as much as 20° F. In years of plentiful

summer rainfall, or when the mustard matured and dried up before the soil moisture was depleted, more seedlings survived under mustard than in the open. When mustard growth persisted into a dry growing season, it robbed the seedlings of moisture, killing most of them. When the mustard was sprayed with 2,4-D in the spring, it was quickly killed, leaving dead shade and reducing competition for moisture; in this case the number of Douglas Fir seedlings surviving was substantially greater than under unsprayed mustard or on bare plots. Other cover crops were tested but were not as satisfactory as brown mustard, which has the advantages of abundant cheap seed, rapid germination without seedbed preparation, and ability to grow rapidly and mature early in spring. Further, it is easy to kill, does not spread and become a noxious weed, and when dead does not increase fire hazard (it is singularly resistant to fire and difficult to burn).

383. Gnezdovye posevy duba v Voronežskoj oblasti. **[Nest sowings of Oak in Voronezh province.]** *Trud. Inst. Les.* No. 14, 1953. pp. 74. 10 refs. [Russ.]

Deals mainly with studies in 1949–50 on the influence of agricultural crops as cover for sowings, including data on microclimate and soil moisture. On the whole, the unfavourable effect of the usual cereals and grasses in reducing soil moisture at critical periods far outweighed any benefits from shelter, and retarded both germination and growth of the Oak. The Oak did best on clean fallow, and next best among curcurbitaceous crops, followed in descending order by maize, potato, sunflower, beans, oats, barley, rye, millet, wheat and grasses.

384. BODROV, V. A. O perspektivah gnezdovogo sposoba kul'tury duba. **[The prospects of raising Oak by the nest method.]** *Agrobiologija* 1956 (5), (142–4). [Russ.] I.M.I.

Using the nest method, 115 ha. near Nikolaevo were sown with acorns (140 kg./ha.); auxiliary species were sown 1 year later. After 5 growing seasons, counts on 82 nests showed a mean of 6·3 seedlings per nest, and mean seedling height was 2 m. The results are considered to compare favourably with those reported for line sowings.

385. BEAUFAIT, W. R. **Simple tool for planting acorns.** *Tree Plant. Notes* No. 28, 1957 (5).

Describes a tool developed at the Delta Research Centre of the Southern Forest Experiment Station and used successfully in experimental sowings. One of its merits is that it ensures a sowing hole of exactly the required depth.

386. HANGANU, C. Rezultatele semănăturilor direct cu arbuşti (lemn cînesc, salbă moale şi sînger) din Ocolul silvic Hunedoara. **[Direct sowing of shrubs (*Ligustrum vulgare*, *Euonymus latifolius*, and *Cornus sanguinea*) in the Hunedoara forest region.]** *Rev. Pădurilor* 1957 (4), (243–4). 2 refs. [Rum.russ.g.]

Best results were obtained with seed from ripe fruit, cleaned of pulp and sown in autumn. Shrubs are sown for controlling or preventing erosion, preparatory to afforestation.

232.4. Formation of Stands by Planting

387. GRIFFITH, A. L. **Planting exotic softwoods in an area with an unreliable climate.** East African Agriculture and Forestry Research Organization, Kikuyu, Kenya. 1957. pp. 16. 8 refs. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

Summarizes the results of 5 years' experiments on plantation technique for exotic conifers (*Pinus* spp. and *Cupressus* spp.) carried out at Muguga, Kenya. Present indications are, that only the very best nursery stock should be used, and planting should be done as early in the planting season as is reasonably safe. Plants may with advantage be planted in the field deeper than they were grown in the nursery. Even bare-rooted stock can be stored in wet gunny for as long as 48 hours after lifting, without deterioration, though this should be avoided if possible. Exposure of the plants between lifting in the nursery and planting in the field, even for as short a period as 15–30 minutes, may be fatal and should be avoided at all costs. Early weeding, in the first two years, has a marked effect on the crop. *From author's summary.*

388. GRIFFITH, A. L. **The effects of depth of planting of exotic Pines at Muguga (Kenya).** *E. Afr. agric. J.* 22 (4), 1957 (175–6). 7 refs.

Experiments over 3 years showed that burying up to half the stem stimulated first-year growth without reducing survival. The heights of *P. radiata*, *P. patula* and *P. leiophylla* set 2 in. deeper were respectively 107, 107, and 115, and for those set 4 in. deeper were 114, 122, and 130% of the mean height for normally planted stock. This confirms work done elsewhere [see *F.A.* 17 No. 2748] on 4 other Pines.

389. DUN, D. B. **The initial survival of *Pinus elliottii* in plantations in northern New South Wales.** *Aust. For.* 20 (2), 1956 (106–23 + 6 photos). 10 refs.

Successful establishment of *P. elliottii* in northern N.S.W. is possible by the use of healthy, dominant seedlings, 9–11 months old, root-pruned to 7 in.; careful lifting from wet nursery beds; the minimum of handling between lifting and planting; complete protection of roots from exposure to sun and wind; planting during April and May following heavy summer rains; and planting 1 in. deeper than nursery level.

232.41. Planting Stock (Type, Handling and Treatment)

See also Nos. 360, 393, 718–9.

390. **[Pine planting stock for areas of low rainfall.]** *Rep. S. Rhod. For. Comm. 1955/56*, [n.d.] (9).

An experiment, started in 1953, on the establishment of Pines in areas of relatively low rainfall where weed growth is rank and soils dry out quickly, was completed. It was found that 2 + 0 plants raised in paper pots or boxes gave significantly better stocking and initial growth than 1 + 0 plants.

391. FAULKNER, R. **The storage of one-year conifer seedlings.** *Rep. For. Res. For. Comm., Lond. 1955/56*, 1957 (123–31).

A more detailed account, with statistical analysis of data, of experiments already reported [see *F.A.* 17 No. 1491].

232.42. Methods of Planting (including Use of Fertilizers etc.)

See also Nos. 311, 342, 404.

392. JACOD, W. Neue leistungsfähige Pflanzverfahren. **[New efficient planting methods.]** *Forst u. Jagd* 7 (4), 1957 (179–83). [G.]

Describes, with diagrams, a number of planting methods (hole planting and notching in various forms) with notes on tools, sequence of actions, number of workers, and on type and size of plant for which each is suitable.

393. GREEN, R. G., and WOOD, R. F. **Manuring of conifer seedlings directly planted in the forest.** *Rep. For. Res. For. Comm., Lond. 1955/56*, 1957 (132–9). 5 refs.

In 1950, as a result of improved nursery techniques, a large number of seedlings (both 1- and 2-year) were produced which were considered large enough for direct planting in the forest. An extensive series of trials of fertilizing, in which strips of seedlings in the forest were manured with substances containing P, K, or combinations of N, P, and K, was laid down. Reports at the end of the first year's growth indicated generally poor survival—Japanese Larch being less satisfactory in this respect than Sitka Spruce—and responses to fertilizing were in general small, only $\frac{1}{6}$ of the 203 trials showing a visible response. At the end of the 4th growing season, a selection of the trials was measured, and soil samples from the subsoil were analysed for total P_2O_5. There was a fairly strong suggestion that there was a 'threshold value' of ca. 1150 p.p.m. of P_2O_5, below which Sitka Spruce seedlings showed growth responses to P fertilizer; the threshold for Japanese Larch appeared to be somewhat lower.

394. ZEHETMAYR, J. W. L. **A trial of compost in planting on peat.** *Rep. For. Res. For. Comm., Lond. 1955/56*, 1957 (139–42). 1 ref.

Reports on an experiment, planted in 1938–9, in which additions of hopwaste compost, and of peat from actively growing plantations of the same species as that planted or sown in the experiment (Sitka Spruce, Lodgepole Pine, Japanese Larch) were compared with untreated controls. Compost produced significant increases in growth, but almost equal increases were produced by simple applications of a P fertilizer. Peat produced no significant increase.

395. BALDINGER-HENKEL. Gribor—ein neues Pflanzlochbohrgerät. **[Gribor—a new plant-hole borer.]** *Holz-Kurier, Wien* 12 (39), 1957 (7). [G.]

Describes the demonstration of a Swiss portable plant-hole borer suitable for use in alpine conditions. A two-man crew can bore 3000 holes a day to a depth of ca. 70 cm. The machine is powered by a 3·5-h.p., 4-stroke petrol engine and weighs 50 kg.

396. JOHNSTON, E. F. **Lowther tree planter modified for silt and clay soils.** *Tree Plant. Notes* No. 28, 1957 (4).

Describes modification of the trencher and addition of side plates.

232.43. Spacing and Arrangement in Plantations

See also No. 422.

397. SCHENSTROM, S. R. Estudio sobre distanciamiento de los árboles de sauce-álamos (*Salix alba* var. *coerulea*) y sobre clareos y turnos de corta en plantaciones del Delta del Paraná. **[Spacing, thinning and rotation of *S. alba* var. *caerulea* in the Paraná delta.]** *Rev. for. argent.* 1 (3), 1957 (91–6). [Span.]

Measurement of height, d.b.h., and b.a. on 2-year-old plantations with initial spacings of (1) 3 × 1·5 m., (2) 3 × 2 m., and (3) 3 × 3 m., showed that (2) produced as great a volume per ha. as (1) and is therefore to be recommended. A study of growth rings in a felled stand with this initial spacing revealed that increment increases up to 4 years of age, when a 50% thinning should be made. Estimates were made of yield from stands spaced at (2) but managed on different rotations viz. 7, 7½ and 10 years respectively. A rotation of 10 years produced the greatest volume of sawtimber and the highest financial returns.

232.5. Artificial Formation of Stands by Vegetative Propagation.

398. SCHLENKER, G. Versuche mit Pappelsetzstangen auf schwerem Mergel-Tonboden des Gipskeupers. **[Trials with Poplar setts on a heavy marly-clay soil on the gypsum keuper.]** *Mitt. Ver. forstl. Standortskunde ForstpflZücht.* No. 6, 1957 (63–4 + 1 plate). [G.]

Of 30 setts consisting of vigorous 1-year-old stool shoots ca. 3 m. long (3 Black × Balsam hybrids and one hybrid Black Poplar), planted 60–80 cm. deep in a moderately dry, heavy clay, 25 rooted and 21 survived, reaching a mean height of 7·9 m. and a mean d.b.h. of 7·5 cm. after 5 years, indicating the suitability of Poplars for these soils without available groundwater.

399. NELSON, T. C. **Survival and early growth of an Eastern Cottonwood plantation in the Piedmont.** *Tree Plant. Notes* No. 28, 1957 (9).

Half an acre of floodland was disc harrowed and planted with unrooted cuttings of *Populus deltoides* at 9 × 9 ft., with ca. 14 in. underground and ca. 6 in. above. The area was flooded for 3 days after planting, and again for 3 days after leafing had begun. Over 88% rooted and survived the first growing season, and average height growth was 7 ft.

233. Afforestation

See also Nos. 14, 41, 52, 152, 309, 394.

400. EDWARDS, M. V., and HOLMES, G. D. **Problems in afforestation.** *Rep. For. Res. For. Comm., Lond. 1955/56*, 1957 (36–9).

At Croft Pascoe, on the exposed Lizard Peninsula of Cornwall, afforestation experiments on soils derived from serpentine rock have made a promising start. Broom grows vigorously and will be a useful nurse. Of the many tree species tried, Sitka Spruce,

Lodgepole Pine (coastal provenance), *Pinus radiata* and *P. pinaster* show good early growth. Experiments in afforesting difficult sites in Mid-Wales and Dorset and smoke-polluted sites in the Pennines, have been continued and extended. At Newborough Warren, Anglesey, a trial of fixing shifting sands by spraying with bitumen emulsion after sowing or planting [cf. *F.A.* 15 p. 264; 19 No. 380] started well, the seed germinating readily through the bitumen crust. Excessive exposure, however, caused many casualties in the autumn.

401. MACDONALD, A. **The Lon Mor—afforestation of deep peat.** *Arbor, Aberdeen* 3 (1), 1957 (22–6). 2 refs.

Summarizes the methods employed and the results after 30 years.

402. OVERBEEK, J. L. F. Bebossing en beplanting in de Nordoostpolder. **[Afforestation and tree planting in the N.E. polder.]** *Ned. Boschb.-Tijdschr.* 29 (7/8), 1957 (191–5). [Du.] [Cf. *F.A.* 18 No. 2816.]

403. ŠVARC, B. Příspěvek k otazce zalesňování málo úrodných polnohospodářských a neplodných pozemků v pohraniční oblasti Šumavy. **[The afforestation of poor and infertile agricultural areas on the borders of the Bohemian Forest.]** *Práce výzkum. Úst. lesn. ČSR* No. 6, 1954 (55–77 + 1 tbl.) 5 refs. [Cz.cz.russ.g.]

Sowings were made in 1952 on trial plots (50 × 50-cm. patches at 130-cm. spacing, and 100 × 100-cm. nests at 200-cm. spacing), using *Alnus glutinosa, A. viridis, Pinus sylvestris, Larix decidua, Fagus sylvatica, Tilia platyphyllos, Acer pseudoplatanus, Populus tremula, Salix caprea* and *S. aurita.* The plots were situated at 700–950 m. alt., in the region of the *Fageto-abietetum hercynicum. T. platyphyllos, F. sylvatica* and *A. pseudoplatanus* were sown under the protection of pioneer species. Sowings on clear-felled areas gave good results on medium-fertile and poor soils. The patch size of 50 × 50 cm. appeared to be too small. On more fertile soils, patch sowing gave good results, but nest sowings were overgrown with weeds and grasses. The effects of soil preparation, canopy, and animal pests are described for the individual species.

404. HIERONYMUS, H. Biologische Meliorationen durch perennierende Lupine bei der Rekultivierung von Braunkohlenkippen. **[Biological soil improvement by planting perennial lupins in connexion with the revegetation of lignite spoil-mounds.]** *Forst u. Jagd* 6 (10), 1956 (465–6). [G.]

Good results were obtained in the Leipzig region by interplanting Poplars, after cultivation, with perennial lupins. Planting the Poplars as cut-back 1-year stock has proved successful and has reduced wind damage.

405. GÜNTHER, H., and MORGENEYER, W. Ein Weidensortenversuch auf einer nährstoffarmen Braunkohlenkippe der Niederlausitz. **[A Willow variety trial on an infertile lignite spoil-mound in the Niederlausitz.]** *Arch. Forstw.* 5 (11/12), 1956 (769–800). 5 refs. [G.g.]

[Cf. *F.A.* 15 No. 3537.] An analysis of the performance in the first 4 years (1952–1955) of 9 varieties of Willow, as regards resistance to frost and to rabbits and hares, height growth, yields by weight and number of rods per stool and per ha., and comparisons with growth on better sites. Though it is too early for final selection of varieties, early growth on this very poor site, after fertilizing, is sufficient to recommend Willow planting. The varieties under trial are of *S. acutifolia, S. viminalis* (3) *S. viminalis* × *S. purpurea, S. triandra* (2), *S. americana,* and *S. alba* var. *vitellina.*

406. MISHRA, P. **Afforestation in the State of Bihar.** *Indian For.* 83 (6), 1957 (371–4 + 4 photos).

407. GUPTA, A. C. **The Sundarbans, its problems and its possibilities.** *Indian For.* 83 (8), 1957 (481–7).

Outlines the history of the area and past attempts to reclaim it, and suggests remedies for the recurrent flooding with salt water, e.g. removing embankments in places and leaving reclaimed areas, now well below river level, to nature for some time, to permit of levelling up; reconstruction of embankments leaving a strip to be afforested between them and the river; provision of shelterbelts to intercept salt spray; and control of silting in rivers and spillways.

408. PRAKASH, M., and CHOWDHARY, M. **Reclamation of sand dunes in Rajasthan.** *Indian For.* 83 (8), 1957 (492–6). 8 refs.

Briefly describes the methods and species being used and success obtained during 4 years of experimental sowing and planting.

409. AHMAD, G. **Contour bunds: their finances and effect on growth.** *Pakistan J. For.* 7 (2), 1957 (151–3).

Dry afforestation in the N.W. Frontier Province, with *Acacia modesta, A. arabica* and *Zizyphus jujuba,* has been much facilitated by the use of discontinuous contour bunds (6 × 1 × 1 ft. and 15 ft. apart, in lines 100–150 ft. apart). Survival and growth are much increased. Experimental sowing of *Ricinus communis* on the bunds was very successful and the yield of seeds will pay for the cost of bunding in ca. 4 years.

410. LACOURLY, G. Rapport sur le rôle des forêts et des arbres pour la protection et l'utilisation des sols dans les zones arides et semiarides de la Tunisie. **[The rôle of forests and trees in soil conservation and land use in the arid and semi-arid regions of Tunisia.]** FAO, Rome. No. *FAO*/56/8/5938, 1956. pp. 8. [F.] Limited distribution.

411. **State afforestation in Southern Rhodesia.** Southern Rhodesia Forestry Commission, Salisbury. 1957. pp. 12. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

Gives a brief account of the early history and methods of land acquisition. The major species used in afforestation are listed, and silvicultural practices in Pine and Eucalypt plantation are described in some detail. Provisional yield tables are given for *Pinus patula, P. caribaea* and *P. taeda.*

235. Underplanting, Advance Planting etc. Nurses and Formation of Mixtures. Interplanting of Inferior Growth

See also Nos. 237, 400.

412. HASSENKAMP. Die sogenannten Bentheimbestände. [**The 'Bentheim stands'**]. *Aus dem Walde, Hannover* No. 1, 1957 (39–49 + 3 photos). [G.]

Describes the present state of stands established ca. 50 years ago by underplanting Pine plantations on heathland west of the Weser, which had suffered from *Fomes annosus*, with Beech and conifers (chiefly Silver Fir), in variously spaced rows, mainly as a soil-improvement measure. More than half of the stands are now poor in stocking and increment. Ground vegetation is still chiefly of the *Vaccinium* type, and infection by *Fomes annosus* is high. This poor result is chiefly due to the failure of Silver Fir. Where Douglas Fir was used, c.a.i.'s of up to 10 cu.m. /ha. were obtained.

236. Care of Regeneration or Plantations in the Initial Stages of Establishment

413. GOODACRE, E. S. **Reproduction assessments.** *Pulp Paper Mag. Can.* 58 (7), 1957 (271–2). (*Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1677 (*F*-2).)

Recommendations to pulp companies on the minimum requirements: area and plot description; age, history, origin, composition; site; stand tally; size of plot; small-growth tally; and growth data (increment borings and stump analyses); and on the additional requirements for final evaluation: physiographic land and site-type overlay maps; special studies; soil maps (including bedrock and drift maps); and statistical analysis of data.

237. Amelioration of Forest Sites

See also Nos. 33, 36, 346, 404.

414. FRANZ, H. Der derzeitige Stand unseres Wissens auf dem Gebiete der Walddüngung. [**Present knowledge on the use of fertilizers in forestry.**] *Allg. Forstztg.* 68 (5/6), 1957 (58–63). 15 refs. [G.]

A survey, based chiefly on literature in German, with some additional information on preliminary results of experiments by the author and others, chiefly on the effect of various organic and inorganic fertilizers on the soil flora and fauna. In general, mineral fertilizers caused a reduction in fungi and an increase in bacteria. Plots fertilized with lime, or lime and phosphates, showed higher N contents, attributed to the activity of micro-organisms.

415. FUCHS, G. Etwas über Ammoniakgas und Rohhumus. [**On NH_3 gas and raw humus.**] *Allg. Forstztg.* 68 (5/6), 1957 (65–8). 1 ref. [G.]

Includes a description of small-scale trials of NH_3 gas for activating raw humus on various degraded sites, experience with a home-made injection apparatus (pressure trouble etc.) and preliminary observations on the lethal effect of the gas on soil insects and some of the vegetation, particularly on *Vaccinium* directly exposed to it. [Cf. *F.A.* 18 No. 1588.]

416. THEMLITZ, R. Zersetzungsgeschwindigkeit von Kalkstickstoff in Gegenwart von Fichtenrohhumus und Umwandlung desselben durch Cyanamid im Vergleich zu Ammoniak bei verschiedener Reaktion. [**The rate of decomposition of $CaCN_2$ in the presence of Spruce raw humus and the conversion of the humus by cyanamide, as compared with ammonia, for different pH values.**] *Z. PflErnähr. Düng.* 75 (3), 1956 (257–68). 11 refs. [G.g.] O.R.S.

[Cf. *F.A.* 17 No. 403.] A study made in an attempt to discover how soon the H_2CN_2, released in the first phase of decomposition of $CaCN_2$ reached a level non-injurious to the germination of Spruce. Decomposition was very rapid especially in the first 14 hours after addition to the raw humus. Quantities applied were equivalent to 84 to > 600 kg. N/ha., and these amounts were decomposed in 10–18 days. This rapid rate of decomposition was confirmed by germination tests with Pine. $CaCN_2$ in amounts equivalent to 0·16, 0·45 and 0·90% N was applied to raw humus, and seeds were sown 1, 2, 4, 8 and 16 days later. Germination was normal with seed sown 1, 8, and 16 days later for 0·16, 0·45 and 0·90% N respectively. N from H_2CN_2 was fixed in greater quantities than that from NH_3 (both applied in aqueous solution) by acid, and still more by limed, raw humus; N fixation increased with increasing application of N. Losses of N by drying out were negligible in unlimed raw humus, but were noticeable with large applications of N when liming had increased the pH value of the humus; drying out to the extent occurring in the laboratory is unlikely in the forest. The solubility of humic substances from unlimed raw humus was higher for NH_3 than cyanamide, but liming reduced the difference.

417. GESSEL, S. P., and SHAREEFF, A. **Response of 30-year-old Douglas Fir to fertilization.** *Proc. Soil Sci. Soc. Amer.* 21 (2), 1957 (236–9). 6 refs. O.R.E.

A dense stand on gravelly, loamy sand with N content of ca. 0·12%, which received 100 lb. N/acre (plus some P, K, and CaO) at the beginning of a 5-year period, with further applications during the period (350 lb./acre in all) had a mean diameter increment of 1 in. compared to 0·5 on a control plot. Increment was higher in both moist and dry years, and was particularly stimulated on the larger trees. Natural competition was intensified, mortality of suppressed trees being 29·2% compared with 17·6% on the control. P.a.i. was 215·5 cu. ft./acre, corresponding to site class III, compared with 126·9 cu. ft./acre on the control (site class V).

238. Timber Plantation Crops requiring Special Treatment

See Nos. 1261, 1266.

24. Tending of Stands and Trees

242. Thinning

See also Nos. 226, 397, 429, 619, 800, 816–7, 889–90, 1133.

418. JOERGENSEN, C. **Thinning experiments: examples and discussion on technique and leading**

principles together with an index of thinning experiments in British Columbia. *Tech. Publ. B.C. For. Serv.* No. *T.*45, 1957. pp. 24. 16 refs. Price $0·50.

419. BJERKE, S., and ANDERSEN, K. F. Overgård hugsten. **[The Overgård thinning system.]** *Dansk Skovforen. Tidsskr.* 41 (2), 1956 (45–71). [Dan.]

The system consists in early thinning (at 15–16 years for Spruce) continued annually to 45–50 years, at first in the form of crown thinning, followed after a few years by fairly heavy thinning, in all size classes, but removing rather more of the larger trees. The volume removed is roughly equivalent to the annual increment, 10–15%. Beech and Spruce stands have been successfully treated this way. The stands obtained are multi-storeyed; fast-growing dominants are removed and succeeded by those from the intermediate storeys, to which there is constant recruitment from the reserve of smaller trees in the lowest storey. B.a. is low and is continually kept down, but in other respects the results resemble those of the selection system, with a fairly constant curve for number of stems and mean diameter. Leading trees reach their maximum increment early, and maximum increment of the stand extends over a long period. The method improves the soil, and the ground flora suggests a higher site class than that indicated by the soil. Return to conventional thinning at ca. 45 years would soon give a normal two-storeyed stand, but there would probably be a drop in yield. The method is more severe than normal Danish thinning practice.

420. MOLTESEN, P. Tyndingens indflydelse på vedkvaliten. **[The effect of thinning on wood quality.]** *Svenska SkogsvFören. Tidskr.* 55 (1), 1957 (1–16). 53 refs. [Dan.]

Gives data from literature on the effect of thinning on stem form (straightness and taper), dimensions, knottiness, annual ring width, density, anatomy (fibre length, cell-wall thickness, and variation in quantity of different types of cell), durability and heartwood formation.

421. PAUL, B. H. **Growth and specific gravity responses in a thinned Red Pine plantation.** *J. For.* 55 (7), 1957 (510–2). 3 refs.

A stand of *Pinus resinosa*, established in 1913 at Star Lake, Wis., was thinned in 1943, 1948 and 1954 [cf. *F.A.* 17 No. 1571]. Samples from 4 points 100 in. apart were taken (*a*) from wood that had been produced after 1st and 2nd thinnings on 10 trees removed in the 3rd thinning, and (*b*) from 10 trees in an unthinned plot. After the first thinning the diam. growth of (*b*) slightly exceeded that of (*a*) at all heights except the 400-in. level; but the diam. growth of (*b*) averaged much less during the second 5-year period, than during the first. The volume increment of (*b*) was higher than that of (*a*) at all levels after the first thinning, but after the second, (*a*) averaged an increase in volume of 34·7% over that of (*b*). The average sp. gr. of wood formed after the second thinning was higher for (*a*) than for (*b*). The highest sp. gr. for both (*a*) and (*b*) was found at the 100-in. level; it was still below the average value of old-growth Red Pine.

422. MARSH, E. K. **Some preliminary results from O'Connor's correlated curve trend (C.C.T.) experiments on thinnings and espacements and their practical significance.** Government Printer, Pretoria. 1957. pp. 21. 6 refs. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

[Cf. *F.A.* 9 No. 816.] Reports on experiments with *Pinus* spp. over 20 years, concluding that: (1) The relations of height to d.b.h. and of form factor to d.b.h. are sensitive to variations in stand density and reflect the onset and development of competition. (2) In free-growing trees of *P. patula*, a given ring maintained an even width at all heights, whereas, in trees subject to competition, ring width increases with height. (3) At all densities, competition comes later than had been supposed, and later on poor than on good sites. (4) In the range investigated (50–1200 stems/acre), prolonged suppression does not impair the ability of *P. patula* to respond to subsequent thinning. (5) A single mean-height/mean-d.b.h. curve derived from stands given a particular thinning treatment, will not adequately reflect the relationship in stands otherwise thinned. (6) The theory that c.a.i. does not vary appreciably over a wide range of densities does not hold for *P. patula* at Nelshoogte, but may be applied for the range 150–300 stems/acre at least up to 20 years. (7) Total volume production can be increased by thinning. (8) The C.C.T. experiments can yield all the results claimed by O'Connor (1935) if other methods of analysis are adopted, and can be recommended for practical use. A method of constructing yield charts is outlined.

423. SMITHERS, L. A. **Thinning in Lodgepole Pine stands in Alberta.** *Tech. Note For. Br. Can.* No. 52, 1957. pp. 26. 9 refs.

In order to develop methods of thinning for dense Lodgepole Pine stands in Alberta, the Forestry Branch undertook in 1937 a programme of research into the growth and development of this species in both treated and untreated stands. A total of 73 permanent sample plots was established during 1937–40 covering a range of stand ages from 5 to 90 years from which ca. 15 years of remeasurement data are available. An analysis of these data has shown that diameter growth responds to thinning at all ages and densities of stand, the best results occurring in very young stands. Natural mortality is not abnormal, and if dense reproduction stands can be reduced to ca. 1500 stems/acre, the subsequent development of merchantable material will be adequate. The studies also show that often the stand may be reduced to 50% of full density by low thinnings without any sacrifice of current growth. Brief recommendations of thinning methods most likely to prove successful under prevailing economic conditions in Alberta have been made. The studies will be continued. *From author's summary.*

424. MOSHER, M. M. **Thinning in sixty-year-old Lodgepole Pine.** *Sta. Circ. Wash. agric. Exp. Sta.* No. 300, 1957 pp. 2 + 2 tbls.

The stand was apparently too old to respond well to thinning, and increased growth rate on thinned plots was too low to make thinning economic.

243. Opening of the Canopy (Increment Fellings, Overhead Release and Improvement Fellings)

See also Nos. 551, 558–61, 842.

425. DAY, M. W. **Killing undesirable trees—a comparison of methods.** *Quart. Bull. Mich. agric. Exp. Sta.* 39 (4), 1957 (687–90).

Five methods, (1) girdling with a portable power machine, (2) applying a basal spray of 2,4-D/2,4,5-T mixture, (3) Na arsenite in holes punched in the base of the tree by a special axe, (4) as (2) but applied to a frill girdle, and (5) Na arsenite applied on tabs of blotting paper under the bark, were tested on 200 trees each. It was found that (1) was the most rapid, (2), (3), and (4) in that order but not very different, and (5) much the slowest.

426. MAPOTHER, H. R. **Arboricides.** *Annual Report of the West African Cacao Research Institute 1954/55*, 1955 (88–9). E.M.B.

Work with arboricides has been devoted principally to the destruction of large forest trees, particularly *Ceiba pentandra* and *Cola cordifolia*, which commonly grow to enormous size, are difficult and expensive to fell, are alternative hosts of Cacao virus and are undesirable shade trees for Cacao for other reasons. The materials tested were (*a*) Na arsenite in aqueous solutions (35 and 50% As_2O_3); (*b*) Na arsenite solutions made up with gelatinized starch to contain 5, 10, and 20% As_2O_3; (*c*) Weedicide (35% As_2O_3); (*d*) NH_4 sulphamate; (*e*) High Aromatic Oil (a distillate containing 60% of aromatic compounds); (*f*) Atlacide (60% $NaClO_3$ + a fire suppressant); (*g*) Santophen 20 (an emulsion concentrate containing 20% PCP, diluted for use with technical white oil to mixtures containing 5 and 10% of concentrate); (*h*) *n*-butyl ester of 2,4-D and of 2,4,5-T and mixtures with technical white oil; (*i*) as (*h*) but isopropyl esters; (*j*) YF 2619 (an emulsion containing 25% each of *n*-butyl esters of 2,4-D and 2,4,5-T, diluted for use to 5% concentrate in white oil); (*k*) YF 2631 as (*j*) but with 35% of the *n*-butyl ester of 2,4-D and 17% of the ester of 2,4,5-T; (*l*) YF 2717 (an emulsion concentrate containing 33% butyl ester of 2,4,5-T). All the preparations caused the death of *Ceiba* trees to which they were applied. Some *Cola* trees survived treatment with (*c*), (*d*), (*f*), (*g*) and ester of 2,4-D. Esters of 2,4,5-T appear to be more efficient tree poisons than those of 2,4-D. Trees took 1–3 years to die, usually disintegrated slowly, and did relatively little damage to the Cacao growing under them.

427. **[Poisoning of unwanted trees.]** *Rep. For. Dep. N. Borneo 1956*, [1957] (17).

The possibility of using butyl-ester arboricides, which are non-toxic to animal life, in place of Na arsenite, is being investigated. Results to date indicate that a 4% 2 : 1 mixture of 2,4-D and 2,4,5-T in dieseline, used as a basal spray, is nearly as effective as poison girdling with Na arsenite, but costs 1⅓ times as much.

428. **Disposal of unwanted trees.** *Rep. Conserv. For., Ceylon 1956, Part II* 1957 (13).

Trials have been made with 2,4,5-T butyl ester in concentrations of 1, 2, and 3% in dieseline. Very satisfactory results were obtained with all concentrations on *Ficus retusa*, which was completely killed in a few weeks. *Artocarpus nobilis*, *Horsfieldia iryaghedi*, *Dipterocarpus zeylanicus*, and *Canarium zeylanicum* succumbed readily. *Gmelina arborea* was very resistant and *Hemicyclia sepiaria* was unaffected.

245. Tending of Trees, Pruning etc.

See also Nos. 614, 716.

429. CONOVER, D. F. **Early thinning and pruning affect limb-free length of northern hardwoods.** *Tech. Note Lake St. For. Exp. Sta.* No. 503, 1957. pp. 2.

An 11-year-old stand of Sugar Maple and American Elm was thinned in 1939 and again in 1947, crop trees being pruned at the same time to half tree-height. Data are presented on the length of clear bole 16 years after the first treatment, for pruned and unpruned trees in both thinned and unthinned plots. In the thinned plot, the pruned trees of Sugar Maple had a longer clear bole than the unpruned, but in dense unthinned plots no advantage resulted from pruning. Pruned trees of American Elm had a longer clear bole in both thinned and unthinned plots.

430. PUDDEN, H. H. C. **A problem in pruning in Kenya.** Forest Department, Nairobi. 1957. pp. 8. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

[Cf. *F.A.* 15 No. 1593; 16 No. 3012; 17 No. 3937.] Describes pruning experiments in very young Cypress plantations, designed to ascertain the optimum pruning régime which would at the same time minimize insect and fungus infection and secure a high yield of knot-free timber. Wound area can be substantially reduced by pruning at an early age, at frequent intervals, and to a greater height; it is affected by the conformation of the branch junction, the tools used and the methods of using them. The time taken for occlusion depends on available soil moisture. The start of occlusion is delayed if pruning is done when there is moisture deficit, and to this extent the season of pruning is important. Pruning in dry conditions can result in recession of the periphery of the wound. Once started, the rate of occlusion is controlled by soil moisture availability. There is considerable inherent variation in occlusion rates between individual trees. The rate of occlusion varies with the aspect of the wound and its position in relation to other wounds. Pruning depresses height and diameter increment. Apparent relative gains in height of high-pruned trees arise from relative height losses from congestion of low-pruned trees whose greater functional leaf areas draw more rapidly on available moisture and nutrients. It is considered that a high-pruned crop can carry a higher density than a low-pruned crop, and that this might partially compensate for volume losses arising from high pruning. The diameter of knotty core progressively increases in treatments involving pruning to less than half total height, and decreases when pruning exceeds half height. Ocular estimates of fractional

heights tend to be seriously low. Evaluation of volume losses must be in terms of sawn volume and proportions of clean and knotty timber, since pruned sections are largely within the basal-swell section of the tree, where taper variation is high. *From author's summary.*

431. PIVI, R. Effetti della potatura mediante degemmazione su *Pinus pinea* L. **[The effects of bud-pruning on *P. pinea*.]** *Ital. for. mont.* 12 (2), 1957 (80–92 + 1 plate). 22 refs. [It.f.]

Gives data from experiments made at Florence, in which two groups of 50 trees each, 9–10 years old, were subjected to bud-pruning and compared with a control group of the same number. Data are tabulated and the illustrations include photomicrographs of wood of treated trees and controls. The following conclusions are reached: (1) Pruned trees showed a marked but unimportant diminution in diameter and height growth, but considerable improvement in wood quality. (2) Needle area of treated trees was not inferior to that of controls, since the loss from whorls removed by disbudding was compensated for by the abnormal size and number of needles on the stem. (3) Needles persist longer on treated trees. (4) Treatment often stimulated the formation of epicormic branching. (5) The branches left at the base on disbudded trees developed abnormally, producing a candelabra form of growth.

432. LIESE, W. Orientierende Untersuchungen zur chemischen Ästung von Pappeln. **[Preliminary tests on 'chemical pruning' of Poplars.]** *Forst- u. Holzw.* 12 (17), 1957 (297–8). 3 refs. [G.]

When lower branches of 2- to 7-year-old Black Poplars were sprayed with Tormona 100 in concentrations of 0·15, 1, or 2%, leaves died within 3 days except in some cases where the weakest solution had been used. With the same exception, branches developed neither leaves nor shoots the following spring. Their bark turned black, and symptoms of decay developed from the tip downwards. They could be easily severed from the stem. A protective layer had formed at the base, and no discoloration or decay had penetrated the stem. The treated branches were markedly infected with *Dothichiza populea, Cytospora chrysosperma, C. nivea* and other fungi. Stools treated with the preparation had not sprouted again. [Cf. *F.A.* 18 No. 4075.]

25. Treatment of Defective, Derelict or Very Open Stands

See also Nos. 240, 436.

433. JONES, E. W. **The potentialities of savanna woodland.** Forestry Commission, London. 1957. pp. 4. 2 refs. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

A discussion of the possible development of savanna woodland towards more valuable forms of high forest.

434. DRINKWATER, M. H. **The tolerant hardwood forests of northern Nova Scotia.** *Tech. Note For. Br. Can.* No. 57, 1957. pp. 25. 13 refs.

The tolerant hardwood stands in Nova Scotia are in a seriously decadent condition. Poor-quality Sugar Maple and Beech dominate nearly all sites and tend to increase as the more valuable Yellow Birch and sound Sugar Maple are either harvested or killed by insects or disease. Suggestions are made for the improvement of these stands by silvicultural measures. [Cf. *F.A.* 18 No. 1618.]

26. Combinations of Forestry with Agriculture and Pastoral Husbandry. Irrigated and Floodland Forests, Shelterbelts etc., and their Treatment

See also No. 1263.

435. SUS, N. I. [Editor]. Agrolesomelioracija. **[Forestry in agricultural improvement.]** Seljhozgiz, Moscow. 1956. pp. 511. 6 pp. of refs. [Russ.]

Designed as a textbook for students of agronomy and forestry in the U.S.S.R. Deals in the main with subjects already treated in another work on this subject [see *F.A.* 18 No. 1619], but has expanded sections on soil erosion and its control, and on sand fixation and reclamation. Chapters by various specialists are included on the natural conditions of the steppe, forest-steppe, and arid regions of European Russia; the influence of shelterbelts on microclimate, hydrology and agricultural crops; type, structure and location of shelterbelts; site preparation; planting and tending techniques; protective plantations on irrigated land and along railways; erosion in lowland conditions; factors influencing erosion; forestry as a means of controlling erosion; organization and techniques of afforestation; erosion in mountainous regions and control techniques; the formation, distribution and fixation of sands and their afforestation, with reference to various sandy areas of the U.S.S.R.

263. Irrigated Forests. Forests subjected to Flooding or Seepage (*Auewald*)

436. AICHINGER, E. Vegetationskartierung als Grundlage für die Überführung von minderwertigen Erlenauwäldern in hochwertige Auwirtschaftswälder. **[Site mapping as a basis for the conversion of floodplain Alder woodlands of low productivity into high-yielding production forests.]** *Allg. Forstztg.* 68 (7/8), 1957 (91–2). 6 refs. [G.]

Discusses, with some examples from Carinthia, the influence of climate, soil water regime, aeration and fertility on vegetation and on the suitability of the sites for Poplar planting, with particular reference to the effects of river training which may seriously interfere with the capillary movement of groundwater, and hence the moisture of the surface soil, if mean summer levels come to coincide with gravelly or sandy layers.

437. TRAUNMÜLLER, J. Die Verwendung der Pappel bei der Auwald-Veredelung in Oberösterreich. **[Poplar planting as a means of improving floodplain woodlands in Upper Austria.]** *Allg. Forstztg.* 68 (7/8), 1957 (95–7). [G.]

Briefly describes the chief site types and reports on the organization, including supply of planting stock, finance, supervision etc., of Poplar plantings in the scattered holdings of small farmers, discussing establishment, varieties, mixtures, fertilizing, etc.

264. Farm Forests

438. JOLLIFFE, W. H. **Trees on the farm. [I:] Trees suitable for Northland. [II:] Trees suitable for Westland.** *N.Z. J. Agric.* 94 (2; 4), 1957 (131–2; 382–3). O.R.E.

(I) Gives a list of trees and hedge plants, particularly those tolerating salt winds; (II) chiefly species for high rainfall, poor drainage, and sites infected with *Armillaria mellea* and/or liable to damage by browsing cattle, noting trees to be avoided on such sites.

265. Strips or Lines at Road, Rail and Canal Sides etc.; Hedgerow Trees

439. MONTANARI, V. Die Schutzwirkung des Pappelanbaus im Überschwemmungsgebiet des Po. **[The protective effects of Poplar plantings in the floodplain of the river Po.]** *Holzzucht, Reinbek* 8 (1), 1954 (5–6). [G.]

During the flood of 1952 in the Polesine area, Poplars with minimum diameters of 15–20 cm. effectively protected buildings round which they grew. More than any other species, they reduced flood damage to agricultural land, irrigation canals etc., and were most resistant to undermining. By slowing down the receding flood waters they increased sedimentation.

440. KAUL, O. N. **Roadside planting in arid wastes of Rajasthan.** *Indian For.* 83 (7), 1957 (457–61 + 2 photos).

Briefly describes planting technique, results and costs. Fencing and watering account for much of the cost. Excellent results were obtained with stumped 2-year seedlings of *Prosopis juliflora.*

266. Shelterbelts, Windbreaks

See also Nos. 25–6, 152, 1258.

441. IIZUKA, H. **[On the standard width of seaside windbreaks.]** *J. Jap. For. Soc.* 39 (5), 1957 (169–74). [Jap.jap.e.]

In order to determine optimum width of coastal shelterbelts, formulae were developed in terms of Σd (sum of d.b.h. per 10-m. length of belt) and *Fu* (resistance value of shelterbelt per 1 sq. m. of vertical area, taking into account drag, air density and velocity, vertical area of the trees facing the wind, and tree height). A tentative index of the age of a shelterbelt is represented by the formula $S = Fu/\Sigma d$. Possible correlations of *Fu* and Σd with relative illumination inside the belt are also discussed.

442. KÜPPER, F. Flurholzanbau und Flurbereinigung im Lande Nordrhein-Westfalen. **[Timber-growing outside the forest, and the consolidation of scattered holdings in Nordrhein-Westfalen.]** *Holzzucht, Reinbek* 11 (2), 1957 (9–12). [G.g.]

Describes some of the work done, chiefly with regard to windbreaks, with recommendations on siting and spacing of hedges and tree rows. Some data are given on the effect on wind velocities, soil moisture and soil temperature of the traditional Beech or Hornbeam hedges of the Monschau region.

443. MAZEK-FIALLA, K. Erfahrungen mit der Pappel bei Windschutzaufforstungen. **[Experience with Poplars in shelterbelts.]** *Allg. Forstztg.* 68 (7/8), 1957 (99–104). [G.]

Deals with the composition, establishment, sites, tending, etc. of shelterbelt plantings in the Vienna basin. Development has led from 3 or more rows of Poplar only, to belts ca. 10 m. wide, with 2 or more rows of Poplar flanked by rows of other trees and shrubs. Root crops, interplanted on fertile sites, proved beneficial against weeds in the early stages.

444. LUPE, I. Contribuţii la cunoaşterea producţiei de fructe în perdelele de protecţie a cîmpului. **[Fruit production in field shelterbelts.]** *Rev. Pădurilor* 1957 (7), (444–8). [Rum.russ.g.f.e.]

Gives data on yields of fruit from *Prunus armeniaca, Rosa canina, Ribes grossularia, R. rubrum, Euonymus europaeus, Ligustrum vulgare, Prunus avium, P. cerasifera* and *P. amygdalus*, from which a substantial part of the costs of establishment can be recovered.

445. GEORGE, E. J. **Cultural practices for growing shelterbelt trees on the Northern Great Plains.** *Tech. Bull. U.S. Dep. Agric.* No. 1138, 1956. pp. 33. 9 refs.

446. SWENSON, W. S. **Squawbush in windbreaks in eastern Colorado.** *J. Soil Wat. Conserv.* 12 (4), 1957 (184–5). 9 refs.

Discusses the merits of *Rhus trilobata* as a shelterbelt species.

268. Pastured Forests. Grazing on Forest and Open Ranges. Forage Plants etc.

See also Nos. 546, 555.

447. PRATS LLAURADO, J. El pastoreo en los montes—contribución al estudio pastoral del levante español. **[Forest grazing: a study of grazing in eastern Spain.]** Patrimonio Forestal del Estado, Ministerio de Agricultura, Madrid. 1956. pp. 119. 53 refs. [Span.]

Surveys climate, soils and agricultural practices, forage and fodder plants, grazing practices and abuses, and recommends improved practices.

27. Arboreta. Arboriculture for Ornamental Purposes. Hedges and Hedge Plants

See also No. 281.

448. A Szarvasi Arborétum leírása és katalógusa. **[Description and catalogue of Szarvas arboretum.]** Szarvas Arboretum, Szarvas, Hungary. 1957. pp. [17] + 25. [Hu.latin g.e.]

The catalogue lists over 1000 woody species, giving Hungarian and Latin names and origin.

28. Husbandry of Forest Products Other than Wood

281. Christmas Trees

449. STIELL, W. M. **Christmas tree growing in Canada.** *Misc. Publ. For. Br. Can.* No. 7, 1957. pp. 21. 15 refs.

Consolidates information on all aspects of the industry for the benefit of growers throughout Canada.

282. Bark Crops

450. NATIVIDADE, J. VIEIRA. Subericultura ibérica. **[Cork cultivation in the Iberian peninsula.]** *Bol. Junta nac. Cortiça, Lisboa* 19 (222; 223), 1957 (155–64; 187–98, xxxvii, 31). [Port.e.f.]

Reviews the history of Cork Oak cultivation in the Iberian peninsula and discusses the maintenance of the biological and ecological equilibrium in Cork Oak stands, problems of regeneration and extension of the stands, and the relations of Cork Oak cultivation with grazing and agriculture.

451. MOTTE, M. Bilan de l'étude expérimentale de la croissance du chêne-liège en Tunisie. **[An experimental study of the increment of Cork Oak in Tunisia.]** *Rev. for. franç.* 9 (7), 1957 (571–82). [F.]

Experimental plots were established in 1933 to determine the effect of stand density on increment and quality of cork and total increment, and the effect of stripping on increment. The general conclusion is that fairly close spacing is desirable since, though both wood and cork increment diminish with increasing stand density, the latter decreases more slowly and the total production is higher in dense stands as well as being of better quality. An incidental finding was that Cork Oak regenerates satisfactorily when fenced against cattle grazing.

283. Fruit and Seed Crops etc.

See No. 444.

284. Crops Tapped for Exudations etc.

See also No. 1198.

452. MAZEK-FIALLA, K. Österreichs Beitrag zur Erneuerung der europäischen Harznutzung. **[Austria's contribution to modern European resin-tapping methods.]** *Allg. Forstztg.* 67 (23/24), 1956 (301–8). [G.]

An illustrated account of various tapping methods, faces, tools, etc. in use for various species, describing more particularly the recommended method of grooved streaks [*Rillenschnitt*] and the tools used for cutting them, also a special holder for resin cups, which is fastened round the tree with a steel tape and does not cause a wound.

453. TERZIĆ, D. Prinos smole crnog i belog bora primenom francuske, nemačke i novoaustriske metode smolarenja. **[The amount of resin from *Pinus nigra* and *Pinus sylvestris*, using the French, German and modern Austrian methods of resin-tapping.]** [*Publ.*] *Inst. Šum. drvnu Industr., Sarajevo* 3 (1), 1957. pp. 190 + 8 photos. 15 refs. [Serb.serb.f.russ.*f.*]

On 2 sites in Bosnia, ca. 400 trees each were tapped by the French and German methods and 200 by the Austrian method, beginning in 1948. *P. nigra* was the main species tapped, but the German method was also applied to some trees of *P. sylvestris*. Data are given on site conditions, and climate, yields and costs. For Bosnian conditions the new Austrian method is preferred, as the yield of resin considerably exceeds that from the other methods, and costs are lower. Experiments were also made with freshening intervals of 3 or 5 days. The author recommends intervals of 5 days at the beginning and end of the season, and 3 or 4 days in the middle.

454. MÖBIUS, K.; HÜBNER, B.; FEST, W. Einige Bemerkungen zur Kiefernharzung in der Deutschen Demokratischen Republik. **[Resin-tapping of Scots Pine in Eastern Germany.]** *Forst u. Jagd* 6 (4–6; 8; 9), 1956 (188–91; 232–4; 273–4; 371–4; 426–9). 29 refs. [G.]

The first author, citing experimental data, advocates the use of narrow, gutterless faces with upward freshening; the other two, citing other experiments, claim that higher yields at lower cost can be obtained from wide faces, and that upward and downward freshening give similar yields for the first 20 streaks, yield falling off thereafter for downward freshening.

455. GÖHRE, K. Der Einfluss der Harzgewinnung auf den Zuwachs, die mechanisch-technologischen Eigenschaften und die Dauerhaftigkeit des Kiefernholzes. **[The influence of resin-tapping on the increment, the mechanical properties and the durability of the wood of *Pinus sylvestris*.]** *Arch. Forstw.* 5 (11/12), 1956 (836–71). 12 refs. [G.g.russ.e.]

Shows, with detailed statistical support, that careful tapping does not materially reduce either ring width or late-wood %. To avoid deformations due to occlusion in the butt log, the tree should be felled immediately tapping is finished. Physical and mechanical properties are not seriously affected. In trees left to grow on, the butt portion will resinify, the sp. gr. of the wood, and with it the compression and bending strength, will increase, whereas the ratios sp. gr./compressive strength and sp. gr./bending strength become less favourable. Sapwood laid down after tapping begins is not more liable to fungus attack than that laid down before.

456. DAVID, R. L'influence exercée par le gemmage du pin maritime sur la constitution du bois. **[The influence of resin tapping on the wood structure of *Pinus pinaster*.]** *C.R. Acad. Agric. France* 43 (4), 1957 (225–7). [F.] A.P.B.

A study of the discoloured sapwood in the region of tapping faces showed that the typical brown discolouration arises from the passage of resin through the tracheids. It spreads inwards towards the heartwood, causing the death of the cells. The author suggests that resin passes into the tracheids through the pits.

457. KOSSENAKIS, G. **Turpentining methods in Greece.** [*Docum.*] *4th Sess. FAO Jt. Subcomm. Medit. For. Probl. Athens 1954*, 1954. pp. 18. [E.]

The species tapped in Greece are *Pinus halepensis* and *P. halepensis* var. *brutia*. Methods of tapping, yields, legal regulations etc. are described.

458. ABE, M., YOKOTA, T., and YASUE, M. **[Studies on natural resins. II. On the turpentining of Akamatsu (*Pinus densiflora*) (2) The second**

year's turpentining with sulphuric-acid treatments.] *Bull. For. Exp. Sta. Meguro, Tokyo* No. 93, 1957 (97–112 + 7 photos). 11 refs. [Jap. jap.e.*e.*]

A progress report. [Cf. *F.A.* 15 No. 1382; 19 No. 1198.]

459. QUINN, G. M., and BENGTSON, G. W. **Gum yield tables for intensively worked Slash and Longleaf Pine on good sites.** *Naval Stores Rev.* 67 (5), 1957 (6–7). 1 ref.

The tables show the influence of tree size and crown length (expressed as d.b.h. and crown-length %) on the quantity of resin produced.

460. BENNETT, F. A. **Gum yield by diameter class and season for Slash Pines.** *Naval Stores Rev.* 67 (4), 1957 (8–9). 4 refs.

Presents first-year results of a study on 100 trees (20 in each of 5 diameter classes), to measure resin yields in plantations. Of 3 variables tested (d.b.h., crown ratio and growth rate) only diameter shows a correlation with resin yield. Differences in diameter, however, accounted only for 25% of the variation. The remainder is attributed to unknown physiological and genetic factors.

461. MARVIN, J. W. **Investigations of the sugar content and flow mechanism of Maple sap.** *Tappi* 40 (4), 1957 (209–16). P.R.

Although the sugar content of the sap of individual trees varies with time, the highest sugar content was always found in the same trees. The paper includes a field and laboratory study of the factors influencing, and the nature of, the sap flow mechanism. [Cf. *F.A.* 18 No. 1644.]

286. Osier-Growing

See No. 405.

287. Bamboo and Cane Growing etc.

See No. 1206.

3. WORK SCIENCE (WORK STUDIES). HARVESTING OF WOOD : LOGGING AND TRANSPORT. FOREST ENGINEERING

462. **List of publications on logging, milling, and utilization of timber products.** *Rep. U.S. For. Prod. Lab., Madison* No. 790, 1957. pp. 26. P.R. [Cf. *F.A.* 18 No. 2154.]

30. Work Science (Work Studies): General

463. **Statements by delegations on recent developments in the field of forest working techniques and vocational training in their respective countries.** [*Publ.*] *2nd Sess. FAO/ECE Jt. Comm. Working Tech., Moscow 1957* No. *FAO/ECE/LOG*/8, 1957. pp. 66. Many refs. Limited distribution.

A note by the Secretariat summarizing reports on recent trends and innovations under the heads: working methods and techniques; mechanization; forest workers' training and safety.

301. Methods of Study

464. VENET, J., and DUTEIL, H. Méthode d'étude des techniques de travail dans les exploitations forestières. **[Procedure in studying working techniques in forest exploitation.]** [*Publ.*] *Jt. Comm. FAO/ECE Working Tech.* No. *FAO/EFC/LOG* 167. pp. 268. 51 refs. [F.f.e.russ.]

A draft scheme, covering plan of study, descriptions of work environment, raw material, and tools and equipment, particulars of the workers, analysis of work, use of films, time studies and physiological studies.

304. Hygiene. Safety; Accidents and their Prevention

465. **Occupational safety and health in forestry operations.** International Labour Organisation, Geneva. 1957. pp. iv + 184. 134 refs.

A report prepared by the ILO for the 2nd session of the Joint FAO/ECE Committee on Forest Working Techniques and Training of Forest Workers, Moscow, Sept. 1957. There are sections on statistics, legislation, inspection, standards and codes, education and training, research, medical aid, housing, and a bibliography.

466. EDLUND, E., and LUNDGREN, N. Studier av hälsotillstånd och arbetsförmåga hos skogs- och järnbruksarbetare samt sambandet mellan dessa faktorer och ryggbesvär. **[Studies on health and working capacity of forest and steelmill workers and the relation between these factors and back troubles.]** *Medd. SkogsforsknInst., Stockh., Ser. Uppsatser* No. 53, 1957. pp. 80. 28 refs. [Sw.sw.e.]

467. WEST, A. S., and PETERSON, D. G. **Biting-fly control.** *Pulp Paper Mag. Can.* 58 (7), 1957 (248 . . . 258). 3 refs.

[Cf. *F.A.* 16 No. 4117.] Summarizes three years' work, particularly on the control of Simuliidae. For personal protection (generally advisable) drab zip-fastened clothing should be worn. Among 5 effective repellents named, diethyl toluamide is outstanding. The merits of spraying from the air against larvae or adults, or various combinations of these and other measures, are discussed. Where streams are accessible, larvicidal treatment is inexpensive, simple and highly effective. For this, 10% DDT in diesel oil is recommended and the dosage (based on stream depth, width and velocity) for dilutions unharmful to fish or their food is given.

307. Tools, Equipment, Machines and Working Animals: General

See also Nos. 260, 311–2, 348, 355–7, 385, 395–6, 474, 547–50, 863–4.

468. **Equipment section.** *Unasylva* 11 (3), 1957 (141–3).

Specifications and photographs of: Rossondoningen trailer (Massey-Harris-Ferguson Export AS, Glostrup, Denmark); Sapper Ditcher (Bomford and Evershed Ltd., Evesham, England); Adams Motor

Grader (Le Tourneau-Westinghouse Co., Peoria, Ill., U.S.A.); Little Woodsman chain-saw filer (Empire Industries Co. Inc., Lewiston, Idaho, U.S.A.); Barr and Stroud dendrometer type F.P.9 (Barr and Stroud, Ltd. Glasgow); Festo cross-cut saw (Festo-Maschinenfabrik, Esslingen a.N., Germany); Mullis Log Skinner (compressed-air barking machine; Carl W. Mullis Co., Lancaster, S.C., U.S.A.); Sumner Portable Chipping Plant (Sumner Iron Works, Everett, Wash., U.S.A.).

469. Informations sur le matériel. **[Equipment notes.]** *Bois For. Trop.* No. 54, 1957 (72–6). [F.]

Specifications, descriptions and illustrations of: Holland Transplanter (Holland Transplanter Co. Inc., Holland, Mich., U.S.A.); Fonrescar Cultivator (Sté. des Charrues, Paris); Mathis plough for fire-breaks; C.D.6 Continental caterpillar tractor (Éts. Richard Frères); Ransome 'stumper' R-100 (Ransome Co., Philadelphia, Pa.).

32. Felling and Related Operations

322. Felling Season. Preparatory Measures

See also Nos. 515, 1081.

470. Shiue, C.-J. **The anatomical and physiological effects of chlorophenoxyacetic acid derivatives on Trembling Aspen (*Populus tremuloides* Michx.) with special reference to the application of such chemicals as debarking agents.** *Abstr. of thesis*, in *Dissert. Abstr.* 17 (6), 1957 (1177). O.R.S.

Butoxyl ethanol esters of 2,4-D and 2,4,5-T were tested in 1955–56. Peeling resistance of Aspen cut in the dormant season was significantly reduced by 2,4,5-T, spraying at breast height being more effective than basal spraying. June treatments were the most effective. The chemical was found to move upwards in the xylem and downwards in the bark, and to have a negligible tangential movement. It increased the osmotic pressure of parenchyma cells, thus increasing water intake, and water loss through transpiration was retarded by death of foliage, with the result that treated bark and wood had a high moisture content [cf. F.A. 19 No. 82]. Peeling resistance of untreated trees was least in the period of rapid growth, when a layer of new unlignified wood cells without secondary thickening was formed. In trees killed quickly during the growing season, this new layer was preserved and lignification and secondary thickening prevented, thus allowing of easy peeling. Tyloses were abundant in the sapwood of treated trees. Bolts from treated trees peeled easily even after air seasoning for 4 weeks, with a reduction from 100% to 30% m.c. Chemical barking did not seriously retard suckering.

471. Myles, D. V., and Jarvis, B. E. **Chemical treatment of trees. A report of practical applications.** *Pulp Paper Mag. Can.* 58 (6), 1957 (177 . . . 195).

A detailed study, based on an analysis of >112,000 cords treated in 1954–56, mainly of White and Black Spruce and Jack Pine, but including other Pines, Poplar, Beech, Birches and Sugar Maple, and describing the reactions of each species to treatment. Points covered are methods (suitability of tools and equipment, field organization, tally of piece rates), chemical (As_2O_3 plus animal repellent) safety precautions, cost analysis, ease of barking, weight reductions from moisture loss before felling, extraction and mill aspects, rot in treated timber, and silvicultural applications.

472. Hosner, J. F., and Minckler, L. S. **Chemical debarking offers means of utilizing Pine thinnings.** *J. For.* 55 (6), 1957 (458–60). 4 refs.

Poison girdling with Na arsenite was tried in May on 8 paired plots of $\frac{1}{5}$ acre in unthinned 18-year-old plantations of Shortleaf Pine in S. Illinois. On half the plots all the trees in every 3rd row were treated, on the other half the same number of trees, selected on the basis of quality and spacing, were treated. By the following spring the bark had loosened and was easily removed. About 100 trees were treated per gallon of solution; average times required are tabulated. The total cost per tree was $0·068 for row thinnings and $0·075 for selection thinnings. Insect damage was negligible.

473. Holmes, G. D. **Chemical bark peeling.** *Rep. For. Res. For. Comm., Lond. 1955/56*, 1957 (48).

A large-scale costing trial was carried out on pole-stage Scots Pine, Sitka Spruce and Japanese Larch, at three forests, to examine the economics of chemical barking. Na arsenite (40% As_2O_3) applied to band girdles on selected trees in late spring was used, and detailed records were kept of subsequent felling, trimming, barking, extraction and loading costs. The trials are still in progress, but first results are disappointing. Barking costs in the autumn after treatment were not reduced, owing mainly to tightening of the bark at the top of treated trees. Wood weight was reduced by 40–50%, but this has not so far been reflected in a marked reduction in extraction and handling costs. Similar trials with various hardwoods gave differing results; Oak and Chestnut peeled easily, Ash and Sycamore Maple badly, Beech, Birch and Elm were intermediate, in that barking was easy over the lower $\frac{2}{3}$ of the stem but bark remained tight at the top. Chemical barking of Oak is not practicable for tanbark production, since it reduces tannin content to an uneconomic level.

474. **The application of machinery to forest work: progress reports on studies undertaken. The chemical barking of timber.** [*Publ.*] *2nd Sess. FAO/ECE Jt. Comm. Working Tech., Moscow 1957* No. *FAO/ECE/LOG*/17, 1957. pp. 3. Limited distribution.

323. Felling and Subsequent Primary Conversion

See Nos. 476–92.

324. Stacking

475. Zieger, E. Probleme der Faserholzaufbereitung in der Forstwirtschaft. **[Preparing pulpwood for sale.]** *Repr.* from *Zellstoff und Papier, Berlin* 1956 (11). pp. 5. [G.]

Discusses the unproductive costs involved in repeated stacking, and proposes changes in organization to avoid this. In this connexion a simple metal frame, 1 m. × 1 m., subdivided by wires into a grid of 5-cm. mesh, for determining solid volume

of stacks is described. Delivery in longer lengths, the use of containers, barkers, etc. are also discussed.

34. Storage of Wood in the Forest and at Log Dumps ('Landings')

See No. 1081.

35. Performance Measurements for Determining Piece Rates in Felling and Related Operations

476. STEINLIN, H. J. **One-man work in mixed stands of Beech, Spruce, and Fir.** [*Publ.*] *FAO/ECE Jt. Comm. For. Working Tech.* No. *FAO/EFC/LOG/*55, 1957. pp. 70 + 10 gphs. 21 refs.

The English version of a work already published in French and German. [See *F.A.* 18 No. 477.]

477. HILF, H. H., and ECKERT, K.-H. Baum- und Festmeterzeittafel für die Kiefer. **[Time tables, per tree and per solid cu.m. produced, for the felling and primary conversion of Scots Pine.]** *Forstarchiv* 28 (6), 1957 (117–9). 3 refs. [G.]

Extracts are given from tables based on the pure working time of a 2-man team.

36. Tools, Machines and Equipment for Felling and Related Operations

See also No. 468.

478. SUNDBERG, U. **The mechanical barking of timber.** [*Publ.*] *FAO/ECE Jt. Comm. Working Tech.* No. *FAO/EFC/LOG/*66, 1957. pp. 105 + 6. 71 refs. [E.russ.f.] Price $0·80 (5*s.*).

Part I gives a short description of the properties of bark, and discusses barking from the technical and economic points of view; Part II discusses the principle, design and performance of different types of barking machine; Part III (80 pp.) is an illustrated catalogue giving detailed descriptions of mechanism and operation of the various machines.

479. MAZODIER, M. D. **Log barking.** *For. Equipm. Note, FAO* No. *D.*14.57, 1957. pp. 20 + 2.

Lists and briefly describes the principal processes and equipment, illustrating them by drawings, diagrams and photographs.

480. SALMINEN, J. Tutkimuksia Veikko I kuorimakoneesta. **[Investigations into the Veikko I barking machine.]** *Tied., Metsäteho, Helsinki* No. 131, 1957. pp. 16. [Fi.e.*e.*]

The machine (illustrated) barks 1-m. hardwood or softwood logs half or completely clean. The barking unit is a cylindrical cutter pressed by hand against the log, which is held by rotating screw blades. The power is provided by a 4- to 5-h.p. motor, and machine plus motor weigh ca. 190 kg. It costs (1957) 289,000 Finnish marks. The machine is used, and can be easily moved, by one man. For logs (diam. 14 cm.) barked half clean, barking rate in this trial averaged 1·61 unbarked stacked cu.m./working hour for Spruce and Pine and 1·21 cu.m. for Birch, and for completely barked softwood logs 0·93 cu.m. The rates were practically double those for manual barking. Wood waste for half-barked logs was insignificant and for completely barked logs very small and similar to that for hand barking. *From author's summary.*

481. GROH, R. Die Forstschau 1957 in Leipzig-Markkleeberg. **[The 1957 forestry exhibition in Leipzig-Markkleeberg.]** *Forst u. Jagd* 7 (6), 1957 (252–5). [G.]

Describes a mechanical seeder and several barkers: (1) with spring-loaded hammers for barking pulpwood, (2) electrical hand tool for barking transmission poles, and (3) a machine for peeling osiers.

482. **Machinery: (1) Portable chain saw filing machine. (2) Bar tender regrooves bars, joints rails.** *Timberman* 58 (8), 1957 (111).

(1) This machine, weighing 1½ lb., clamps on the saw-bar and files and joints the chain without removal from the bar, using any type of file. Dial controls ensure settings to 0·01 in., both sides of the chain being filed exactly the same, with the file working towards the cutting edge to eliminate burr. (Nygan Industries, Richmond, Calif.) (2) Regrooves to an even width and depth in the exact centre of the bar (depth and centring adjustable) and joints the rails squarely and with uniform height for a smooth chain surface. It is powered by a ¾-h.p. motor with permanent lubrication and thermal overload protection. (Oregon Saw Chain Corporation, Portland, Ore.)

483. MCKENZIE, W. M. **The performance of scratch type power saw chains.** *Aust. Timb. J.* 23 (4), 1957 (59 . . . 76, 107). 7 refs.

[Cf. *F.A.* 17 No. 2863.] Makes recommendations on sharpening and setting, hook and top angles, front and top bevels, raker clearance etc. for timbers of the light, heavy and very heavy groups, represented by *Eucalyptus regnans, E. rostrata* and *E. sideroxylon* respectively.

484. FUJIBAYASCHI, M. **Lumbering (wood-felling and log-making) by the one-man type chain saw.** *Trans. 64th Mtg. Jap. For. Soc.* 1955 (275–7). [Jap.?] From *abstr.* in *Rec. Res. Fac. Agric. Univ. Tokyo* No. 6, 1957 (83–5). [E.]

Tests were made on the Partner and Be-Bo (Swedish) and Mall OMG and McCulloch 3·25 (American) saws, in felling 60-year *Cryptomeria japonica.* Tabulated figures show outturn and costs compared with hand sawing. It is concluded that chain saws are more effective and less tiring than hand saws in mountain forests in Japan.

485. **Machinery and equipment.** *World Crops* 9 (7), 1957 (305–6). O.R.E.

Describes a portable circular saw, the 'Tree hog', of British manufacture, running on a small rubber-tyred hand-propelled carriage and equipped with a 27-in. blade which can be fixed in 12 different positions—horizontal, vertical, at an angle, close to the ground or elevated. It is powered by a 320- or 420-c.c. petrol engine, and is designed chiefly for tree felling, cross-cutting, and scrub clearing.

486. HARRER, H. Der 'Haukuli' stellt sich vor. **[The 'Haukuli'.]** *Holz-Kurier, Wien* 12 (39), 1957 (9–10). [G.]

Describes a combination hand tool chiefly designed for work in plantations. It consists of a sturdy blade with one knife- and one saw-edge, and a reinforced head for attaching other tools, e.g. sickle,

adze, increment borer, etc. The grip is hollow to take a long handle.

487. REINEKE, L. H. **The Norwegian screw splitter for fuelwood.** *J. For.* 55 (6), 1957 (464–5).

Describes and illustrates the patented 'Skru-Kløyvern' for splitting round wood. The splitting device is a revolving, steeply tapered screw, flanked above and below by two diametrically opposite splitting wedges. Additional equipment consists of a stand on runners, a motor and an adjustable table. The splitter works best with the harder woods and will split logs up to 14 in. in diam.

488. **Brush and timber clearing rig.** *For. Equipm. Note, FAO.* No. *B.*856, 1956. pp. 1.

Specification and photo of a brush cutter mounted on a crawler tractor, manufactured by Wade Lahar Construction Co., Mountain Home, Ark., U.S.A. Two of these machines can cut at ground level enough small trees and brush to keep 9 bulldozer-equipped tractors busy stacking.

489. **Land clearing equipment.** *For. Equipm. Note, FAO* No. *B.*10.57, 1957. pp. 2.

Photographs of a tree-dozer, tractor-mounted saw, and timber rake, for attachment to a Fowler Challenger tractor (Bomford Bros. Ltd., Evesham, England).

490. **Machinery and equipment: automatic scything.** *World Crops* 9 (4), 1957 (174). O.R.E.

Describes the 'Flexythe', a mechanical scythe cutting a 20-in. swathe, powered by a 98-c.c. four-stroke B.S.A. engine through a 15-ft. flexible shaft. It is said to be suitable for dense bracken, light secondary jungle or undergrowth.

491. **Machinery and equipment. A monkey winch.** *World Crops* 9 (5), 1957 (216–7). O.R.E.

Describes the Trewhella, a monkey winch, hand-operated by the to-and-fro movement of a 5-ft. lever arm, which can exert sufficient pull to bring down large trees, with sufficient steel rope to clear 2 acres from one anchorage.

492. H., R. Der Motorsägebock 'Odenwald'. **[The 'Odenwald' trestle for use with power saws.]** *Holz- Zbl.* 83 (88), 1957 (1090). [G.]

Describes a portable trestle, made of metal tubing, for cross-cutting pitprops etc., on which a chain saw can be quickly and firmly mounted. It is equipped with an adjustable length stop, a horizontal roller to assist in the lifting of logs, and a vertical guide roller.

493. KUCHLENZ, F. Methode zum Besteigen besonders starker Bäume mit Hilfe von Bauklammern. **[Method for climbing trees of large diameter, using building clamps.]** *Forst u. Jagd* 6 (10), 1956 (473–4). [G.]

The climber, securing himself by the usual rope and safety belt to the first clamp, placed ca. 1 m. from the ground, knocks in a second one above his head in such a manner that it holds between its prongs a second, long rope, one end of which is attached to his belt while the other is held by 1 or 2 helpers on the ground who, by tightening the rope, help him to climb to the next position. The rope is then slackened and the process repeated.

37. Transport

372/377. Land Transport

See also Nos. 468–9, 856–8, 860.

494. **The application of machinery to forest work: progress report on studies undertaken. The mechanical loading of timber on trucks.** [*Publ.*] *2nd Sess. FAO/ECE Jt. Comm. Working Tech., Moscow 1957* No. *FAO/ECE/LOG*/19, 1957. pp. 4. Limited distribution.

495. GLAS, H. Einiges über das Schichtholzbeladegerät. **[A pulpwood loader.]** *Forst u. Jagd* 7 (1), 1957 (38–9). 2 refs. [G.]

Describes a loading device easy to fix to the side of a lorry, its conveyor system being driven by a take-off from the lorry engine. In a test, 5 cu.m. of Beech pulpwood in 1-m. lengths were loaded in 27 min., mounting and dismounting of the loader taking a further 4 min.

496. **Log-unloading grapples.** *For. Equipm. Note, FAO* No. *C.*20.57, 1957. pp. 1.

These grapples (Berger Engineering Co., Seattle) work on a 75-ton crane structure with an open span of 16 ft., wide enough to span any trailer or railway-wagon load of logs.

497. FEDOROVICI, C. Rampe mobile simple pentru încărcarea lemnului rotund. **[Simple, transportable ramps for loading round timber.]** *Rev. Pădurilor* 1956 (9), (604–8). [Rum.russ.g.]

Describes, with scale drawings, the construction of the ramps, and gives graphs for determining the dimensions and number of elements in the ramp for loading different sizes of log.

498. **The application of machinery for forest work: progress report on studies undertaken. Full tree logging.** [*Publ.*] *2nd Sess. FAO/ECE Jt. Comm. Working Tech., Moscow 1957* No. *FAO/ECE/Log*/18, 1957. pp. 3. Limited distribution.

499. KAUFMANN, G. VON. Le débardage du bois en le faisant glisser par sa pesanteur. **[Extraction of wood by sliding under the action of gravity.]** [*Publ.*] *FAO/ECE Jt. Comm. Working Tech.* No. *FAO/ECE/LOG*/15, 1957. pp. iv + 48 + 3 + 30 photos & dgms. 10 refs. [F.f.e.russ.]

Discusses the extraction of timber by sliding, in favourable conditions on bare ground, but more usually in chutes. Gives detailed instructions for the construction of chutes made of logs or, for certain limited conditions, of sheet metal, and for their use, with some examples from practice.

500. STEFAN, M. Consumurile de materiale la instalaţiile pasagere pentru scosul si apropiatul lemnului. **[Quantities of material needed for the construction of chutes and flumes for transport of wood.]** *Industr. Lemn.* 4 (4), 1955 (126–30). [Rum.]

Gives tabulated data on the quantities/m. of steel and round wood needed for the construction of chutes and flumes of different dimensions, for the transport of firewood.

501. ŞTEFĂNESCU-MEREI, C. Linii de alunecare-goange. [**Sledge-ways.**] *Rev. Pădurilor* 1957 (4), (260–7). [Rum.]

Describes (with photos and diagrams) the construction and operation of sledgeways, used for extracting timber on slopes up to 15°. They are in the form of a corduroy track with rails formed of round wood, and several coupled sledges are drawn by a tractor. No brakes are necessary on slopes up to 8°–9° (14%).

502. FEDOROVICI, C., and MUTICĂ, C. Adaptarea transportoarelor gravitaţionale cu role la exploatările forestiere. [**Adaptation of gravity transport on rollers to forest operations.**] *Industr. Lemn.* 4 (1), 1955 (7–16). 3 refs. [Rum.russ.]

Gives various data, with plans and drawings, and costs in comparison with other methods. Tabulated data include minimum gradients for different types of gravity transport (flumes, chutes, rollers) dimensions of logs and of rollers, weight of loads (round wood and converted lumber) for different gradients, costs and performance of different types of installation.

503. TRITSCHLER, A. Langholzrücken mit Seil im Schwarzwald. [**Ground skidding logs by cable in the Schwarzwald.**] *Forstarchiv* 28 (7), 1957 (142–6). 5 refs. [G.]

An account of ground skidding by gravity in the Schwarzwald. A description is given of the use of the 'Seilbub' motor winch, designed specially for this work. After freeing the log at the foot of the slope, the logging crew hold the cable as it is being winched in, to assist them on their uphill return trip.

504. Traktorvinschning. [**Tractor winching.**] *Skogsägaren* 33 (8), 1957 (220–3). [Sw.]

A double-drum winch mounted on a tractor was successfully used to skid logs and bundled pulpwood to the tractor and to load it on to a sledge. Equipment and lay-out of the operation are illustrated. While financial aspects have not yet been worked out, it is clear that the method would be economic only for clear felling on large areas.

505. MAY, M. Le débardage des bois à la traine. [**Skidding of timber [up-hill] by cable and winch.**] [*Publ.*] *FAO/ECE Jt. Comm. Working Tech.* No. *FAO/ECE/LOG*/14, 1957. pp. 70 + 39 photos, drawings, dgms. & gphs. 27 refs. [F.russ.e.]

Part I deals with coefficients of friction, speed of skidding, volume of logs extracted, power of motors used; Part 2 equipment (winches, cables, and accessories); Part 3 skidding methods (single winch, double-drum winch and return cable, vehicle-mounted winch); Part 4 performance and costs of different methods.

506. HAFNER, F. Ein einfacher Kurzstrecken-seilkran zum Bergaufzug bei horizontal aufgehängter Last. [**A simple short-distance skyline crane for up-hill extraction, with the load suspended horizontally.**] *Allg. Forstztg.* 68 (13/14), 1957 (198) [G.]

A brief illustrated description of an installation having a single fixed cable and a single-drum winch, for distances up to 900 m., requiring only low supports.

507. **Endless 'Lasso' logging cableways.** *For. Equipm. Note, FAO* No. *C.*21.57, 1957. pp. 3.

Describes, with illustrations, an improved system for handling heavier timber, a combination of the Lasso-Cable with the traditional bi-cable type of overhead cableway, recently introduced with success under the trade name of Lasso 3 S.

508. IRIE, T. [**On the vibration of aerial cableway suspended by two poles. On the vibration of the aerial cableway with a carriage load.**] *J. Jap. For. Soc.* 39 (2; 3), 1957 (67–9; 96–101). 12 refs. [Jap.jap.e.]

509. KASTNER, J. Praktische Vorschläge bei Verwendung von Seilkränen. [**Practical hints for the use of skyline cranes.**] *Allg. Forstztg.* 68 (1/2), 1957 (11–2). [G.]

Discusses methods for improving the downward movement of the carriage by altering cable tension, using intermediate supports hung on cross wires, reducing friction, ballasting the carriage, etc., methods of load fixing, suitable cables etc.

510. SÖDERLUND, J. A., and HELMERS, U. Dragkraftsbehov vid virkestransport på barmark. [**Traction power requirements for timber transport on bare ground.**] *Svenska SkogsvFören. Tidskr.* 55 (2), 1957 (91–213). 15 refs. [Sw.e.*e.*]

Summarizes results of a study in 1951–55 on the frictional resistance of different horse-drawn vehicles (waggons, logging wheels, sledges and skidding pans) on ground without snow-cover, on different surfaces and substrata. Results are given in tables and graphs.

511. **The Rolli-Tanker.** *For. Equipm. Note, FAO* No. *B.*9.56, 1956. pp. 1.

A rubber petrol tank in the form of a large rubber roller that can be towed behind a tractor. (Goodyear Tire and Rubber Export Co., Akron, Ohio.)

512. LEPITRE, C. Débardage et construction des routes au 'D.7' Caterpillar à la Société Corre Frères. [**Logging and road-making with a D.7 tractor.**] *Bois For. Trop.* No. 54, 1957 (27–40). [F.e.span.]

A time study on a single operation in the Ivory Coast. The large amount of idle time involved in the use of tractors in such operations is stressed (32% of working hours during extraction). Extraction of very large logs (23–27 cu.m.) is slow and difficult and probably uneconomic, and cross-cutting at stump is recommended. Research is advisable on bundling of smaller logs before skidding.

513. TUOVINEN, A., and WÄRE, I. Kokemuksia traktoriniputuksesta. [**Experience of tractor bundling.**] *Tied., Metsäteho, Helsinki* No. 123, 1956. pp. 16. [Fi.e.*e.*]

Recommendations on clearing or compacting the surface of the storage site, on road networks, and on equipment for bundling and handling and transporting bundles.

514. **Roll trailer.** *For Equipm. Note, FAO* No. *C.*18.56, 1956. pp. 1.

Specification and photograph of trailer with 60

tons capacity, with tandem axle bogies at front and rear (Pacific Truck and Trailer Ltd., Vancouver, B.C.).

378. Water Transport

515. JOHANSSON, F. Studier över torkning, vattenupptagning och lagringsskador hos helbarkad sulfatved. II. Jämtland. **[Studies on drying, water absorption and storage damage in completely barked [Pine] sulphate wood. II. Jämtland.]** *Uppsats. Instn. Virkeslära K. Skogshögsk., Stockh.* No. 10, 1957. pp. 38 + 28 tbls. 16 refs. [Sw.sw.]

Results largely confirm those for Värmland [see *F.A.* 18 No. 4150].

516. NYLINDER, P. Undersökning över flytbarheten hos flottgods i Pite älv: en metodstudie. **[Research on the floatability of timber in the Pite river: a study of methods.]** *Uppsats. Instn. Virkeslära K. Skogshögsk., Stockh.* No. 9, 1957. pp. 27 + 10 tbls. 5 refs. [Sw.sw.e.]

The density of a number of logs chosen at random and the frequency distribution of the different assortments are determined. The difference between the truncated and the actual non-truncated distribution is then calculated by graphs. The relative number of logs in the distribution above a given green weight (the limit of floatability) expresses the risk of sinking. For the Pite river the limit appears to be 985–990 kg./cu.m. solid measure for sawtimber and 980–985 kg. for sulphate pulpwood. The % sinking risk for the different assortments (unbarked and barked Pine sawtimber and sulphate pulpwood) is tabulated. *From author's summary.*

517. FEDOROVICI, C. Determinarea greutăţii specifice a lemnului destinat pentru plutire. **[Methods of determining the specific gravity of timber for rafting.]** *Industr. Lemn.* 4 (2), 1955 (42–51). [Rum.]

Develops tables and graphs for determining the sp. gr. of logs of different dimensions from (*a*) the height of that part appearing above water or (*b*) the depth of the submerged part, when floating.

518. EKLUND, R. Atron nipunsiirtolaitteen koekäyttö onnistunut. **[A successful experiment using Atro's timber bundle carrier.]** *Metsät. Aikak.* 1957 (1/2), (15, 17). [Fi.e.]

The new carrier [illustrated], designed and manufactured by Kone Oy., has been installed at a power plant in E. Finland to carry bundles from the upper to the lower side of a dam. It consists of a horizontally moving crane on a bridge, and carries two bundles, each resting on 4 curved prongs that can be turned through an angle of 90° for loading or releasing the bundles. An 80-kw. engine is used to power the direct lift, and one of 9·5 kw. for horizontal transport. Lifting speed is 14 m./min., horizontal speed 40 m./min., and the maximum load 17·5 tons. While the load is being lowered the engine serves as a generator. *From author's summary.*

519. **Utility barge—'Eager Beaver'.** *For. Equipm. Note, FAO* No. *B.*11.57, 1957. pp. 1.

Describes a craft manufactured by S. Madill, Ltd., Manaimo, B.C., Canada, that can be used for towing, rafting, freight carrying, or beach-combing.

38. Forest Engineering

383. Roads and Bridges

See also No. 468.

520. HAFNER, F. Das deutschsprachige Fachschrifttum über den Waldwegebau im Zusammenhang mit der geschichtlichen Entwicklung der Forstaufschliessung im deutschen Sprachgebiet. **[The technical literature on forest road construction in German, and the history of the opening-up of forests in German-speaking countries.]** *Forst- u. Holzw.* 12 (16), 1957 (267–70). 49 refs. [G.]

Deals chiefly with literature in book form (including sections of general works) from the middle of the 18th century to the second World War, but also mentions recent publications and authors.

521. SMITH, F. J. **Extraction road location and road clearance technique.** *Aust. Timb. J.* 23 (7), 1957 (17, 19, 123).

A note on the location of roads in a Pine plantation area, from contour maps and aerial photos, with their minimum and maximum gradients, governing points, etc., the tractor and dozer work and vehicles used, and the timber extraction and stump blasting done in the clearance.

522. ROSENSTOCK. Stabilisierter Wegebau im praktischen Forstbetrieb. **[Stabilized earth roads in practical forestry.]** *Forst- u. Holzw.* 12 (16), 1957 (278–82). [G.]

Discusses methods, equipment, and costs for varying soils and moisture conditions.

523. SCHWARZ, H. Die Schwingungsverdichtung und ihre Anwendung im forstlichen Wegebau. **[The use of vibration compacting in forest road-building.]** *Allg. Forstztg.* 67 (21/22), 1956 (287–8). 3 refs. [G.g.]

Discusses the mechanics of vibration compacting and describes the 'Bohn und Kühler' compacter, weighing 2·4 tons, with a metal ground-plate of 1 sq. m. actuated by a Volkswagen industrial motor so as to produce both vertical impulses, causing the plate to vibrate and jump, and horizontal impulses causing the machine to move along the ground and allowing it to be steered. The frequency range is 10–30 cycles/sec. Passing the machine over the ground twice has the effect of rolling with a 12- to 15-ton roller. Rubber wheels can be fitted for transport to the site.

384. Protective Works, including Torrent Training

524. BERNARDINI, F. Contributo alla sistemazione delle frane del'Appennino Emiliano (parte prima). **[The stabilization of landslides in the Emilian Appenines. Part I.]** *Monti e Boschi* 8, (7) 1957 (311–21). [It.f.e.]

A general account of the causes of such landslides, and techniques employed for controlling them.

385. Drainage, Irrigation, Sedimentation. Water Supply

See No. 468.

4. FOREST INJURIES AND PROTECTION

525. SCHWERDTFEGER, F. Die Waldkrankheiten. Ein Lehrbuch der Forstpathologie und des Forstschutzes. **[Forest diseases and pests: a textbook of forest pathology and forest protection.]** Verlag Paul Parey, Hamburg & Berlin. 2nd ed. (rev.) 1957. pp. 486. Many refs. [G.] Price *DM.*39·40.

The present edition has been considerably revised, particularly in the sections on population fluctuations and chemical control. Its main chapters deal with the agencies—abiotic (fire, smoke, weather and soil factors) and biotic—that cause injuries; susceptibility and resistance; the course and symptoms of forest injuries, disorders and diseases; their economic consequences; and finally, prevention and control. There is an index of pathogens and pests by host species, subdivided by age attacked and type of injury. Literature references have been brought up to the end of 1956. The emphasis throughout is on an ecological approach.

41. General Technique of Forest Protection. Types of Injury

526. MCKEEN, D. C., and MCGUGAN, B. M. **A general review of plant protection organization in Canada.** Department of Agriculture, Ottawa. 1957. pp. 11. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

527. **Symposium on foreign plant quarantines and regulatory administration.** *Phytopathology* 47 (7), 1957 (381–9). 11 refs.

Contains papers, mainly from the U.S. viewpoint, on: Principles and current problems (*F. A. Soraci*); Federal crops regulatory work (*M. R. Clarkson*); Implications of the amendment to the Insect Pest Act 1905, with a summary by sections of the proposed Federal Plant Pest Act (*H. S. Dean*); Interterritorial exchange of pathogen specimens (*W. H. Wheeler*); and The recognition of important diseases before their spread into new countries (*A. J. Riker*). [Cf. *F.A.* 19 Nos. 873, 1102.]

528. SHREEVE, N. G. **Electrodusting.** *World Crops* 9 (5), 1957 (205–6). O.R.E.

Describes a new technique in which an electrostatic charge is imparted to the dust as it leaves the nozzle of the dusting machine, resulting in even and uniform distribution of dust on both sides of a leaf, improved adhesion, and a reduction in quantities required.

42. Injuries from Inorganic Agencies other than Fire

421. Air Currents

See also Nos. 270, 1098.

529. WETMAN, G. F. **The chief causes of blowdown in pulpwood stands in Eastern Canada.** *Woodl. Res. Index Pulp Pap. Res. Inst. Can.* No. 99, 1957. pp. 8. 2 refs.

Answers to a questionnaire show that most of the damage is done in narrow valleys, at lake ends, and on ridges; on S. or S.E. aspects; on shallow (6–18 in.) soils; in mature stands with Spruce or Balsam dominant, dense Spruce > 50 ft. high and with deep crowns being particularly susceptible; in Balsam that has butt rot (stem breakage) and in overmature stands; during August–October; and after heavy rain. Precautions in silviculture and cutting methods are recommended.

422. Temperature Influences. Frost. Heat. Drought

See also Nos. 164, 172, 292, 617–8, 749, 808.

530. DAUBENMIRE, R. **Injury to plants from rapidly dropping temperature in Washington and northern Idaho.** *J. For.* 55 (8), 1957 (581–5). 13 refs.

Abrupt invasions of abnormally cold air masses in late autumn or early winter were recorded in 1924, 1935 and 1955. An account is given of damage to exotic and native species. It is concluded that coastal ecotypes are less well adapted to their climate than inland ecotypes, and for some purposes, e.g. Christmas-tree production, it may be safer to use inland ecotypes for coastal plantations. There is no evidence that low temperature extremes have any influence in determining the ranges of native plants.

531. WEBER, G. F. **Cold injury to young Pine trees.** *Plant Dis. Reptr.* 41 (5), 1957 (494–5). A.P.B.

Describes the yellowing, browning and, in some cases, death of young needles of *Pinus elliottii* after January low temperatures in Gainesville, Fla.

532. HORD, H. H. V., GROENEWOUD, H. VAN, and RILEY, C. G. **Low temperature injury to roots of White Elm.** *For. Chron.* 33 (2), 1957 (156–63). 6 refs.

Ulmus americana failed to leaf properly at Saskatoon, Sask., in the spring of 1950 after unusually cold weather in January. Although precipitation in 1949 and the first 6 months of 1950 was well above average, the symptoms were characteristic of moisture deficiency. Trees on cultivated ground and those with growth rate below average suffered most. It is concluded that the symptoms were the result of the killing of roots by unusually low winter temperatures. *From authors' summary.*

533. JOHNSON, W. C. **Frost heaving, soil type, and soil water tension.** *Abstr. of thesis*, in *Iowa St. Coll. J. Sci.* 31 (3), 1957 (452–3). 1 ref. O.R.E.

Describes laboratory experiments with undisturbed samples of 4 soils (2 silty, clayey loams, 2 loams) on the rate of heaving over a range of water tensions. This was found to be not closely related to particle-size or pore-size distribution. Treatment of a soil with a detergent or a silicone diminished the rate of heaving.

534. OKSBJERG, E. Sommervejret 1955 på en midtjydsk lokalitet, og tørkens virkning på parceller med tidligt- og sentudspringende rødgraner. **[The summer of 1955 in central Jutland and the effect of the drought on plots of early- and late-flushing Norway Spruce.]** *Dansk Skovforen. Tidsskr.* 41 (6), 1956 (273–302). 5 refs. [Dan.e.]

May–Sept. 1955 was characterized by cold weather in May and June followed by a period of dry warm weather unbroken, except for a week in early August, from July to October. The cold spring caused a delay of 3 weeks in the flushing of Norway Spruce, planted as 2 + 2 stock in 1952. Height increment of the late-flushing Spruces (*a*), was significantly lower than for the early-flushing (*b*), in which leader growth and lignification were ending at the beginning of the drought. Visible damage to the plants was confined almost entirely to (*a*) and to grass-grown areas, 94–98% of (*a*) in these areas showing damage ranging from dieback of the extremities and of the new shoots to death of the plants, compared with 4–5% of (*b*). None of the trees surviving the first 3 weeks of drought died later. Similar observations on other species are briefly described.

424. Soil Conditions. Erosion Effects. Nutrient Deficiencies etc.

See also Nos. 33–6, 38–40, 607, 752.

535. Němec, A. Krnění a nezdar lesních kultur na hadcových půdách jižních Čech následkem intoxikace niklem, kobaltem a chromem. **[Stunted growth and failure of forest plantations on serpentine soils in southern Bohemia as a result of nickel, cobalt and chromium poisoning.]** *Práce výzkum. Úst. lesn. ČSR* No. 6, 1954 (5–54). 22 refs. [Cz.cz.russ.g.]

Gives results of analyses of the mineral constituents of stunted Scots Pine, Birch, *Salix caprea* and *Sorbus aucuparia* on a serpentine soil containing garnierite, at Chlumeček near Kremže, Bohemia. The total Ni content in the profile down to 100 cm. was 0·026–0·260%, that of Co, 0·0091–0·0231%. Extremely high Ni and Co contents were found in the foliage, bark and stemwood of the 4 species studied; the mean % contents of Ni and Co, respectively, in the assimilatory organs were: Pine, 0·0195, 0·1883; Birch, 0·0895, 0·2570; *Salix caprea* 0·0200, 0·0529; *Sorbus aucuparia*, 0·0066, 0·0517%. The maximum non-toxic values are said to be 0·00001–0·0005% Ni and 0·000001–0·00004% Co. Somewhat lower Ni and Co contents, but still much above these toxic threshold values were found in a serpentine soil of degraded rendzina type at Nemčice near Vlašim, Bohemia. The soil pH was 5·51–6·10, so that the stunting could not be attributed to acidity. When plantations of Alder, Lime and Hazel on the same soil were fertilized with ground limestone and diabase meal, the uptake of Ni and Co in foliage was considerably reduced, but that of Cr and Cu was increased.

536. Benzian, B., and Warren, R. G. **Copper deficiency in Poplar cuttings.** *Rep. Rothamst. exp. Sta. 1956*, 1957 (57–8).

In 1955 'needle tip-burn' on Sitka Spruce seedlings grown at Wareham was shown to be due to Cu deficiency [cf. *F.A.* 18 No. 1518]. The black discoloration of the leaves of *Populus* × *robusta* cuttings grown on the same soil has now been diagnosed as a deficiency of the same micronutrient. Symptoms were greatly reduced by a soil application of a fritted trace-element material containing Fe, Mn, Cu, Zn, Mo and B, and by foliar sprays of Cu applied as a lime/$CuSO_4$ mixture.

425. Chemical Influences (Atmospheric)

537. Eršov, M. F. O fotosinteze čistyh i zapylennyh list'ev lipy melkolistnoj i vjaza melkolistnogo. **[The photosynthesis of clean and smoke-grimed leaves of *Tilia cordata* and *Ulmus pumila* var. *arborea*.]** *Dokl. Akad. Nauk SSSR* 112 (6), 1957 (1136–8). 6 refs. [Russ.] A.P.B.

Field studies were made on *T. cordata* and *U. pumila* var. *arborea* in Kuibyshev. Leaves on the specimen trees were cleaned; then leaves on some branches were dusted with soot (smoke deposit from a coal-fired boiler) at a rate of 2–2·5 g./sq. m. of leaf surface, and others were left clean. The photosynthetic activity of the clean and sooty leaves was measured *in situ* for (*a*) 6 days in June and (b) 6 days in September. The photosynthetic production of dry matter was much greater for the clean leaves (for Lime (*a*) by 33% and (*b*) 43%; for Elm (*a*) by 20% and (*b*) 23%). The effect is regarded as due mainly to reduction of light. During (*a*), photosynthesis for the sooty leaves was most rapid in the early morning, but was greatly depressed or stopped almost completely at mid-day when the soot appears to have caused overheating by increasing the absorption of thermal radiation.

538. André, F., and Hartig, W. Interessante Beobachtungen über die Ermittlung von Rauchschäden. Erste Mitteilung. **[Assessing smoke damage. First report.]** *Allg. Forstztg.* 68 (17/18), 1957 (262–4). 3 refs. [G.g.]

Briefly describes experiments comparing air-pollution tests with rags impregnated with BaO, hung both in the tree tops and below the canopy of Spruce stands, with analyses of needles collected at the same points. S content of the atmosphere (expressed in mg. H_2SO_4 content of the rags) was, at equal distances, markedly greater above than below the closed canopy, suggesting that the tallest trees would suffer most. While absolute S content of needles (also expressed in mg. H_2SO_4) gave no indication of smoke damage, relative differences in S content between 1-year-old and 5-year-old needles proved to be a useful indication.

539. Pelz, E. Gasförmige Luftverunreinigungen und Holzartenwahl in Gebieten mit Industrierauchschäden. **[Gaseous air pollution and choice of species in districts with industrial smoke hazards.]** *Forst u. Jagd* 6 (8), 1956 (347–9). 12 refs. [G.g.]

Discusses the effect of site factors, ecological type, etc. on susceptibility to chronic or acute exposures to SO_2, HF and other gases. Considerable individual differences in susceptibility were observed in a Spruce stand which had been exposed to SO_2 for 60 years.

540. Zimmerman, P. W., and Hitchcock, A. E. **Susceptibility of plants to hydrofluoric acid and sulfur dioxide gases.** *Contr. Boyce Thompson Inst.* 18 (6), 1956 (263–79). 12 refs.

The effects of HF and SO_2 gases were determined and compared on 49 species of plants. At given concentrations and periods of exposure, some species were susceptible to HF but resistant to SO_2, and some susceptible to SO_2 but resistant to HF.

A few were equally susceptible to both gases, and some were equally resistant. In tests with HF alone, concentrations of the gas ranged from less than 1 to 100 parts per billion (10^9), by volume, and periods of exposure were usually six to eight days. The concentration for SO_2 gas ranged from 0·2 to 1·1 parts per million (10^6), and the periods of exposure were 2–8 hours. Special equipment and methods were developed for fumigating plants in the field and in greenhouses. Stomatal counts for upper and lower epidermis of leaves showed no relation between the number of stomata per unit leaf area and relative susceptibility to either gas. All species, when grown in pots or under field conditions, stored F; a few, e.g. *Cornus florida*, *Deutzia* sp., *Dichapetalum cymosum*, and *Camellia* sp., accumulated abnormally large amounts of F in the leaves. There was considerable difference in rate of absorption by different species when the plants were fumigated, and different parts of the plant absorbed different amounts of F. The results should serve as an aid in diagnosing symptoms in vegetation round industrial areas. *From authors' summary.*

541. BEELER, M. **Salt spray injury along the Jersey coast.** *Shade Tree* 30 (7), 1957 (2).

A sea-fog, blowing inland for 10 days in Oct. 1956, carried so much salt that within 3 days television aerials became coated with it so that reception almost stopped. As it was the end of the growing season, little damage was observed on plants except for some burning of evergreen foliage. In the spring, however, extensive damage was apparent for as much as one mile inland. Some Pines and Spruces were killed outright and almost all broad-leaved trees are stag-headed.

43. Forest Fires

542. WEITZ, S. **[Forest fires.]** *La-Yaaran* 7 (3/4), 1957 (15–20, 38–37). [Heb.e.]

Local increases in fires are due to farm mechanization (which leaves more roadside brush) and the influx of careless immigrants. Damage increases with the intensity of the *khamsins* blowing in May–June and October. Conventional preventive and fighting methods are used in plantation areas. A policy is proposed of further publicity, devolution of fire fighting on to local councils and of the cost on to landholders, quicker penal procedure, and suppression courses for villagers, foresters and conservation officers.

431. Predisposing Factors and Causes. Fire Danger. Fire Behaviour

543. SCHAEFER, V. J. **The relationship of jet streams to forest wildfires.** *J. For.* 55 (6), 1957 (419–25). 10 refs.

The theory is advanced that blow-up forest fires are sometimes brought about by the presence of a jet stream of high velocity in the higher levels of the atmosphere. Characteristic features for detecting and locating a jet stream are described, and a detailed description is given of a forest fire at Dudley Lake, Ariz., in 1956, with particular reference to the prevailing atmospheric conditions. Data are tabulated on the relationship of forest fires to jet-stream velocity for 23 major fires in Western States in 1955 and 1956. In most cases, blow-up occurs when the axis of the jet-stream sweeps across the burning region, but blow-up fires are also found in a zone of severe conflict between two jet streams.

544. KING, J. A. **Meteorological aspects of forest fire danger rating.** *J. S. Afr. For. Ass.* No. 29, 1957 (31–8). 5 refs. [E.e.afrik.]

The effect of weather on inflammability and fire behaviour is discussed. Inflammability indices derived from rainfall, humidity and temperature figures over 8 years for January–March, were used in place of fuel-moisture indicator sticks, which were not available, in determining fire-danger rating in Jan.–March 1953–55, using the Model 8 Burning Index Meter developed at the Forest Fire Laboratory, Missoula, Mont, U.S.A. Comparison of actual fire data with the ratings showed that more than half the fires occurred on days of low rating. The need of developing an objective method suitable for rating forest-fire danger under S. African conditions is stressed.

432. Prevention and Control

See also No. 469.

545. WOODS, W. H. **Forestry and fires.** *Arbor, Aberdeen* 3 (1), 1957 (30–5).

A general account of forest fire control with particular reference to N.E. Scotland and an account of a fire on the Glentanar Estates, involving 3600 acres.

546. **Fertilized—seeded—grazed firebreaks are effective.** *Rep. Sth. For. Exp. Sta. 1956*, 1957 (87–8).

Of 3 methods of preparing firebreaks, (1) burning between ploughed lines (*a*) with, (*b*) without double disking, and (2) triple-disking the grass rough, all followed by fertilizing and seeding, (2) was the most economical and practical. With close grazing in the first year, the strips, originally 16·5 ft. wide, remained 15 ft. in width, but when cattle were later attracted to prescribed burns near by, they shrank to 10 ft.

547. MURMANN, W., and DEICHMANN, V. VON. Ein Beitrag zur Waldbrandbekämpfung unter besonderer Berücksichtigung von Löschtechnik und Löschgeräten. **[Forest fire control, with special reference to suppression methods and apparatus.]** *Forstarchiv* 28 (6), 1957 (130–2). 4 refs. [G.]

Reviews briefly the techniques practised in Kleve, Niederrhein, and discusses the equipment in use, including 2 tank trailers constructed locally, the Mannesmann-Regenkanone [see *F.A.* 17 No. 2904] and 3 hand sprayers—Minimax,Total and Tornado.

548. ELY, J. B. *et al.* **Air tankers—a new tool for forest fire fighting.** *Fire Control Notes* 18 (3), 1957 (103–9).

Successful fire suppression by agricultural-type aeroplanes carrying up to 120 gal. of water in tanks with outlet valves, was carried out in 1955 [see *F.A.* 17 No. 2924] and the efficacy of NaCa borate as a

fire retardant has also been established [see *F.A.* 18 No. 4187]. During 1956 the California State Division of Forestry used air tankers in as many fire situations as possible; they made drops under all sorts of conditions, ranging from hot, rolling brush fires to small lightning fires in timber, and in fires of < 1 acre to > 4000 acres. The results left no doubt that water or a water/NaCa-borate mixture dropped from aircraft can have a significant effect on grass, brush, and timber fires. NaCa borate does a better all-round job than water. Some of the uses of air tankers are to: (1) hold a small fire until initial ground forces arrive; (2) cool down the hot spots so that men can enter the area and work safely; (3) knock down spot fires; (4) build a fire-retardant line with NaCa borate in advance of a fire, or where men cannot work; (5) reduce the probability of a crown fire; (6) strengthen existing fire lines; (7) directly support ground forces who are actively engaged in line construction; (8) fire-proof local areas where spot fires are probable, such as exposed slopes in steep canyons. Situations in which air tankers cannot help are control of hot, rolling brush or timber fires, or hot fires in heavy fuels under timber stands; they cannot work at night or safely make drops in high winds (> 30 m.p.h.), or make drops in the bottom of steep canyons or other inaccessible places. The aircraft used throughout were Stearman biplanes. To obtain the greatest concentration of liquid on the ground, the plane should fly level, as low and as slowly as conditions permit, and as nearly into the wind as possible. Drops from > 100 ft. above the vegetation will usually be wasted.

549. REINHARDT, R. E. **The Gordon Bade water rake.** *Fire Control Notes* 18 (3), 1957 (127–9).

Describes, with photograph, scale drawings, and specifications, a tool devised by G. M. Bade of Arizona, for use on smouldering duff and litter. The end of a hollow handle is attached to a hose, water flows through the handle to a lateral distributor pipe with small holes in it corresponding to the concave teeth of the rake. The volume is controlled by a thumb valve at the end of the handle. The tool is effective with low water pressure and will use less water if the pump pressure is reduced.

550. BAILEY, E. E. **Use of power saws in fireline construction.** *Fire Control Notes* 18 (3), 1957 (116–9).

Experiments have been carried out by the California State Forestry Division to test the efficiency of power saws in the construction of fire lines in heavy brush on terrain not negotiable by bulldozer. Three circular saws, 3 bow saws and 2 electric saws with a 1500-watt generator were used. The conditions of the tests are described in some detail. The results showed that the circular saws will do the most work in average brush areas, but the bow saw would be the most adaptable in heavy stands of diameter $\geqslant 4$ in. Though there were no accidents, the men engaged were of the opinion that the circular saw was a potential hazard to adjacent workers. The lightness and smallness of the electric saws proved a disadvantage, the operator having to expend more energy in pushing the saw through the stems and kneeling to reach them; the generator was not easy to handle on steep slopes or rocky ground and needed two men to keep it moved up and the cords untangled. A minimum width of 10 ft. is necessary for the lines, to give room to swing the circular saw and ensure the safety of workers with all types of saw. There was little difference in rate of work uphill and downhill; the added difficulty of cutting stumps low enough when going downhill offset any natural slope advantage. The best crew size for power saws (except electric saws) would be 6 men, i.e. 1 operator, 2 'swampers' and 3 men clearing the line to the mineral soil.

435. Benefits of Fire Control. Injurious Effects of Fire

See Nos. 587–8.

436. Beneficial Effects of Fire. Uses of Fire in Silviculture and Other Forms of Husbandry

551. HODGKINS, E. J. **Some early effects of prescribed burning on the soil, forest floor, and vegetation in the Loblolly-Shortleaf Pine forest of the upper coastal plain of Alabama.** *Abstr. of thesis*, in *Dissert. Abstr.* 17 (6), 1957 (1176). O.R.S.

Plots were burnt in August (1951 and 1954) or January (1952 and 1955) and hardwoods were poisoned with NH_4 sulphamate in spring 1952. August burnings reduced the forest floor more than January ones and left a dangerously thin floor on some plots in 1954, but the autumn leaf-fall soon gave adequate protection to the topsoil from raindrop impact. The loss of N, K, Ca, and P from the forest floor was in direct proportion to the loss of the floor itself. Burning raised the pH of the top 3 in. of mineral soil and added more K and Ca than the forest floor had lost, presumably from vegetation killed by the fires. Available P was increased in the 1954–55 burnings. There was no change in total soil N or organic matter, in porosity of the top 3 in., or infiltration rates. Legumes, composites and euphorbs increased in density in the first season after burning but subsequently returned to normal, shrubs and vines increased by the third growing season, hardwoods under 6 ft. high were reduced but returned to normal by the third season, and grass cover varied inversely with that of trees, shrubs and vines. Hardwood poisoning appeared to cause an increase of soil N and organic matter on ridges.

552. FERGUSON, E. R. **Stem-kill and sprouting following prescribed fires in a Pine-hardwood stand in Texas.** *J. For.* 55 (6), 1957 (426–9). 4 refs.

Prescribed burns were made at 4 times of the year in 1952 on a total of 24 half-acre plots of immature Loblolly/Shortleaf Pine, with a fairly dense understorey of Sweet Gum (*Liquidambar styraciflua*), Post Oak (*Quercus stellata* var. *stellata*) and Red Oak (*Q. falcata* var. *falcata*). After 2 years, head fires had killed more stems of all species than back fires. Hardwoods $< 1{\cdot}5$ in. in diam. showed 80–100% stem-kill (without regard to subsequent coppice growth); of those between 1·5 and 4·5 in. in diam. less than half were killed. More hardwood stems were killed by fires in the growing season than in the

dormant season, but the difference was not significant except for Sweet Gum. A relatively small number of hardwood rootstocks were killed (10–20%) and further burns are needed to control coppice growth. The number of coppice shoots increased with increasing diameter of the original stem. Fires that controlled the hardwoods best also killed the most Pines; proportionately fewer Pines were injured, but a larger number of Pine root-stocks were killed.

44. Damage by Harmful Plants. Virus Diseases

441. Weeds

See also Nos. 249, 425–8, 470, 488–90.

553. SHIMODA, M. **[Research on the clearing of fern site (Report 2).]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 99, 1957 (171–7). [Jap.e.]

By cutting in late October, the growth of *Gleichenia linearis* and *G. glauca* in the following spring is strongly retarded. This is not so effective as treatment with a flame projector or chemicals, and for reforestation sites requires repetition for 2 or 3 years. [Cf. *F.A.* 17 No. 2934.]

554. ROE, E. I. **Measuring the results of aerial spraying with herbicides for forestry purposes.** *Tech. Note Lake St. For. Exp. Sta.* No. 492, 1957. pp. 2.

Makes recommendations on methods of sampling to determine the effect of spraying, including time of sampling and the size, number and distribution of plots according to the size of area sprayed, and a statistical test of significance for differences between estimated actual and desirable percentage kill.

555. **The first East African herbicide conference.** *E. Afr. agric. J.* 23 (1), 1957 (1–37). 33 refs.

Includes a general review (*E. W. Russell*); Selectivity of herbicides (*R. L. Wain*); General aspects of chemical weed control in tropical and subtropical countries (*R. K. Pfeiffer*); The weed problem in E. Africa (*G. R. Cunningham van Someren*); and The Chesterford logarithmic sprayer (*P. Gregory*); with a summary of the other papers and discussion (*D. W. Duthie*), including accounts of arboricides in the control of bush regrowth in sisal and pasture land and for tsetse reclamation. E. African silviculturists report on the control of trees, shrubs and *Eucalyptus* coppice. Systematic list of weeds are included. Initial work on the suppression of *Digitaria scalarum* is reported.

556. ABEL, A. L. **The substituted urea herbicides.** *Chem. & Ind.* 1957 (33), (1106–12). 20 refs. P.R.

Describes the manufacture and properties of Monuron (CMU), Diuron (DCMU), Fenuron (PDU) and Neburon.

557. KARSCHON, R. **[The effect of CMU [3-(*p*-chlorophenyl)-1, 1-dimethyl urea] on Eucalypts.]** *La-Yaaran* 7 (3/4), 1957 (12–5, 39–38). 4 refs. [Heb.e.]

The use of this soil sterilant on road verges (at 18 lb./acre) is associated with chlorosis and marginal leaf scorch, and even death, in *E. rostrata*, where its roots enter treated soil. Analyses exclude mineral deficiency as a cause. Other woody plants, e.g. *Pinus halepensis*, are affected and even killed. Until the effects of application rates, persistence in the soil, and the spread of root systems are better known, CMU should not be used near trees.

558. MARTIN, S. C. **You can kill Post Oak saplings in Missouri with Ammate and an axe.** *Sta. Note Cent. St. For. Exp. Sta.* No. 105, 1957. pp. 2.

In 1950/51 experiments were made in killing Post Oaks of $\geq$ 3 in. diam. with various Ammate preparations. The author recommends the dormant-season treatment of the stump, immediately after cutting, with a solution of 4 lb. Ammate crystals/gal. water. The stump should be cut low. For treatments during the growing season the dosage should be increased.

559. **[Poisoning of Mangroves.]** *Annual Report, Department of Agriculture, Sierra Leone* 1954 (16). From *abstr.* in *Weed Abstr.* 6 (4), 1957 (332). O.R.E.

Further trials with arboricides on *Rhizophora* sp. were made, using higher concentrations than in the 1953 trials. 2,4-D at 6 and 10 lb./acre when painted on bark and through cuts resulted in defoliation and eventual death; 2,4,5-T at 10 lb./acre and MCPA were slightly less effective. NH_4 sulphamate had no effect.

560. LUNDBERG, H. Om åtgärdsvalet vid lövröjning med hormonpreparat. **[The choice of methods in killing hardwoods with growth regulators.]** *Skogen* 44 (14/15), 1957 (472–3). [Sw.]

Conclusions from a number of time studies are given in brief. Crown spraying proved cheaper than poison girdling when the trees were short enough to be treated with a knapsack sprayer. Knapsack spraying is generally cheaper if there are $<$ 1000 clumps/ha. and aerial spraying for $>$ 2000 clumps/ha. Stem spraying is considerably cheaper than poison girdling or crown spraying, but is relatively ineffective against large Birch and may cause greater damage to young conifers. Portable motor sprayers gave promising results and reduced to less than $\frac{1}{4}$ the amount of liquid needed. If only part of the hardwood vegetation is to be removed, poison girdling or, to some extent, stem spraying, should be used.

561. ROE, E. I., and BLOCK, A. E. **Aerial spraying of upland brush before planting effectively reduces need for plantation release.** *Tech. Note Lake St. For. Exp. Sta.* No. 502, 1957. pp. 2.

In July 1954 a 20-acre site near Babbitt, Minn., that had been clear-felled in 1945 and was covered by a dense 4- to 5-year growth of Hazel, Willow, Green Alder, Mountain Maple, and Dogwood, was sprayed from the air with a 50/50 mixture of 2,4-D and 2,4,5-T at a rate of 2 lb. per 4 gal. oil/water emulsion per acre. In May 1955, Red Pine and White Spruce seedlings were planted on the site and on 2 adjoining unsprayed strips. After 2 growing seasons only 13% of the Red Pine and White Spruce were overtopped, compared with 75% and 62% respectively on the unsprayed area, and release operations can be delayed for another year. This method of site preparation is much cheaper than, and as effective as, disking.

562. LEONARD, O. A., and CRAFTS, A. S. **Translocation of herbicides. III. Uptake and distribution of radio-active 2,4-D by brush species.** *Hilgardia, Berkeley, Calif.* 26 (6), 1956 (366–415). 9 refs. From *abstr.* in *Weed Abstr.* 6 (4), 1957 (430). O.R.E.

The translocation of 2,4-D C^{14} in 7 species of brush was studied. Two sites were chosen, and by making periodic treatments and samplings in both areas it was possible to cover many stages of growth, and different conditions of humidity and temperature. Each treatment in 1953 involved the application to 1 leaf of each of 3 or 4 plants, and bark samples were collected at various distances from the treated leaf ranging from a few inches to 5 ft. In 1954 treatment was increased to 10 leaves per branch and application made to the undersurfaces. These gave good radio-autographs of bark, leaves, stem tips and inflorescences. *Baccharis pilularis* absorbed and translocated 2,4-D only slightly in February, intensely in April, less in May and June and not at all in July. In February and March movement was downward from treated leaves, in April almost entirely upward. Little translocation of 2,4-D by *Salix lasiolepis* occurred before April 15th; from late April until late summer translocation was continuous. *Ceanothus cuneatus* translocated 2,4-D very little. Application to the lower surfaces of the leaves resulted in rapid killing of the treated leaves. 2,4-D was absorbed and translocated by *Arctostaphylos manzanita* throughout May; after this time it was not possible to remove samples of bark. Absorption and translocation of 2,4-D in *Photinia arbutifolia* was prominent from February to October, transport was primarily downward again by autumn. Tracer studies on *Quercus douglasii* were mostly negative. The leaves were very sensitive to contact injury. Translocation of 2,4-D was active from February to September. These results emphasize the deleterious effect of contact injury on uptake and transport of the herbicide. In evergreen species the herbicide may move for many months, whereas in deciduous species it may move only during relatively short periods. Importance of soil moisture and root growth to transport is shown. Finally, it is concluded that a single application cannot be expected to control mixed brush populations under Californian conditions.

563. BRUNS, V. F., RASMUSSEN, L. W., and WOLFE, H. H. **Cattail and Willow control in Washington.** *Extension Miscellaneous Publication, Washington Agricultural Extension Service, Pullman* No. 43, 1956. pp. 3. From *abstr.* in *Weed Abstr.* 6 (4), 1957 (315). O.R.E.

For controlling Arroyo [*Salix lasiolepis*] and other species of Willow, 1 or 2 lb. acid equivalent 2,4-D (amine, low-volatile ester or emulsifiable acid) in 50 or more gal. water/acre is recommended. June is the best month for treatment and complete coverage of all foliage is important. Treatment of regrowth in the following year usually completes eradication. By reducing the volume of water from 300 to 50 gal. the mixture recommended for cattails (2,4-D diesel-oil/water emulsion containing 4 lb. acid equivalent (low-volatile ester) + 10 gal. diesel oil + 1 pt. emulsifier + 250–300 gal. water per acre) may be used as a dormant spray for Willows. Oil is important for dormant spraying.

564. MASERA, M. Sperimentazione di prodotti del tipo fitormonico impiegati quali decespuglianti in zone montane. Nota I. **[Trials with preparations of the plant-hormone type used for clearing shrubs in the mountains. Note I.]** *Annali della Facoltà di Agraria, Milano* (*n.s.*) 4, 1955 (253–62 + 3 photos.) [It.] A.P.B.

Various preparations and mixtures of 2,4-D and 2,4,5-T esters were tested on *Rhododendron ferrugineum, Juniperus communis, Vaccinium* spp., *Calluna vulgaris, Alnus viridis, Rosa canina* and *Erica carnea.* The most efficacious treatment was a mixture of 2,4-D and 2,4,5-T (59·9% acid equivalent) in an aqueous emulsion, followed by butyl esters of 2,4,5-T at acid equivalents of 50% and 39·8% in that order. The most susceptible species were *Vaccinium* spp., *R. ferrugineum* and *J. communis*, in that order.

565. HOLMES, G. D. **Chemical weed control.** *Rep. For. Res. For. Comm., Lond. 1955/56*, 1957 (47).

Experiments on the chemical control of *Rhododendron ponticum* are in progress. First indications are that it can be fairly effectively controlled by applying NH_4 sulphamate solution to cut stumps. Basal bark spraying for Oak and Birch coppice with formulations of 2,4,5-T and 2,4-D showed some promise, but more study is necessary to find the best treatment. Control of *Calluna vulgaris* with 2,4-D in oil has been fairly successful, but the best way of doing this has not yet been worked out. If a successful and cheap method of killing heather can be found, it may be very useful as a follow-up treatment after ploughing, to delay re-invasion by the heather.

566. **Eradication of *Eucalyptus* coppice and *Lantana*.** *Tech. Note For. Dep. Uganda* No. 6/57, 1957. pp. 1.

Gives details of small-scale trials. These species were successfully killed with Kiltree (2 : 1 mixture of 2,4-D and 2,4,5-T, 80% acid equivalent) at various dilutions in diesel oil.

567. **[Chemical control of *Philippia hexandra*.]** *Rep. S. Rhod. For. Comm. 1955/56*, [n.d.] (10).

In an attempt to eradicate this ericaceous species, plots were treated with lime and sprays. Liming had mainly only a temporary effect on ground vegetation of grasses and ferns. *P. hexandra* in plots treated with 2,4,5-T in diesel oil and with Santobrite [Na PCP] suffered dieback of 20–50% of branches except near the top.

568. **Dowpon—lalang and grass eradicant.** *R.R.I. Planter's Bulletin, Kuala Lumpur* 29, 1957 (27–30). From *abstr.* in *Weed Abstr.* 6 (4), 1957 (374). O.R.E.

Experiments have shown that dalapon (74% acid equivalent 2,2-dichloropropionic acid) at 10 lb./acre will successfully destroy standing lalang (*Imperata cylindrica*). The maximum degree of kill is not observed until 2 months after application, and under good conditions lalang has been completely controlled for 6 months when followed by rounds of oil-wiping 4 and 5 months after spraying. Little

advantage was gained by applying $NaClO_3$ or Na arsenite 3 months before the application of dalapon. Dalapon will not control *Eupatorium odoratum* or *Borreria latifolia* which often colonize sprayed lalang areas. Dalapon can cause severe defoliation and terminal dieback of shoots of *Hevea* when quantities of about 30 lb./acre are applied near susceptible clones. Observations 6 months after spraying showed that *Pueraria phaseoloides* was killed by dalapon at 10–20 lb./acre and that *Mikania scandens* invaded the sprayed areas. It is also claimed that dalapon at 15–20 lb./acre has controlled bracken.

442. Parasitic Higher Plants. Climbers and Epiphytes

569. BRENDER, E. V., and HODGES, C. S. **Honeysuckle or trees?** *Res. Note Stheast. For. Exp. Sta.* No. 103, 1957. pp. 2. 2 refs.

Experiments in the control of *Lonicera japonica* in Georgia showed that foliage sprays of (1) butoxy ethanol ester of 2,4-D and 2,4,5-T (2 : 1 ratio, 2 lb. acid equivalent in 250 gal. water), and (2) 50% 3-amino-1,2,4-triazole wettable powder in 125 gal. water, in early summer, repeated for (1) when resprouting occurs, for (2) when leaves turn green again, gave good control, but at high cost.

443. Fungi and Bacteria

See also Nos. 69, 115, 122–6, 155, 746; 750.

570. GAGNOTTO, A. V. Le malattie delle piante ornamentali osservate in Italia. Parte II. Angiospermae Monocotyledoneae. **[Diseases of ornamental plants recorded in Italy. Part II. Angiosperms; Monocotyledons.]** *Ann. Sper. agr.* (*n.s.*) 11 (3), 1957 (i–lxvi). Many refs. [It.] C.G.B. [Cf. *F.A.* 18 No. 4205.]

571. FABRICATORE, J. A. Le malattie delle piante ornamentali osservate in Italia. Parte seconda. Dicotyledoneae. **[Diseases of ornamental plants recorded in Italy. Part II. Dicotyledons.]** *Ann. Sper. agr.* (*n.s.*) 11 (3), 1957 (lxvii–ciii). Many refs. [It.] C.G.B.

Covers the families Celastraceae—Lauraceae (in alphabetical order).

572. FABRICATORE, J. A. Le malattie delle piante ornamentali osservate in Italia. Dicotyledoneae. Parte terza. **[Diseases of ornamental trees recorded in Italy. Dicotyledons. Part III.]** *Ann. Sper. agr.* (*n.s.*) 11 (4), 1957 (i–xxx). [It.] C.G.B.

Covers the families Leguminosae to Ranunculaceae in alphabetical order.

573. GIBSON, I. A. S. **A note-book on pathology in Kenya forest plantations.** Government Printer, Nairobi. 1957. pp. 27. Price 2*s*.

Intended as a brief introduction, covering damping off, wood rots (root, butt, heart and structural timber), bluestain, Cypress canker, *Diplodia pinea* on Pines and purple root-rot in *Chlorophora excelsa*.

574. MOORE, A. E. **Bibliography of forest disease research in the Department of Agriculture.** *Misc. Publ. U.S. Dep. Agric.* No. 725, 1957. pp. 186.

References are arranged alphabetically by authors and cover research from 1899 to 1954.

575. RACK K. Beschreibung und Arbeitsweise eines einfachen Sporenfanggerätes. **[Description and method of using a simple spore trap.]** *Z. PflKrankh.* 64 (6), 1957 (332–40). 15 refs. [G.e.] E.M.B.

The trap (illustrated) consists of a glass funnel, mounted horizontally and attached to a weather vane, so that the mouth always faces the wind; the small end nearly touches a slide smeared with e.g. glycerine, or vaseline, on which the spores are trapped. The apparatus was designed, and has been successfully used, to trap spores of *Lophodermium pinastri*.

443.2. Diseases of Seed and Seedlings; Damping Off etc.

See also No. 612.

576. NOHARA, Y., and ZINNO, Y. **[Experiments on the control of damping-off of conifer seedlings. (I) Effect of soil treatment with pyroligneous acid.]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 96, 1957 (105–28 + 29 photos). 24 refs. [Jap.jap.e.*e*.]

Samples of the acid (p.a.) from Beech, Oak, Pine and Bamboo were tested against cultures, and the effective ingredients identified by elimination. Beds in 5 nurseries were inoculated with *Rhizoctonia* or *Fusarium* spp. and treated with p.a. or with H_2SO_4 or Uspulun for comparison, and sown with *Larix leptolepis*, *Pinus densiflora*, *Chamaecyparis obtusa*, *Cryptomeria japonica* and *Zelkova serrata*. The fungicidal property of p.a. varied widely with the parent material; it increased with sp. gr. of the p.a., and acetic acid appeared to be responsible for a good deal of the toxic effect. Beds treated with the mother liquor of p.a. at 8 litres/sq. m., 5 days before sowing, showed the least damping off. Seedling growth was improved and weeds reduced.

577. TERASHITA, T., and ZINNO, Y. **[Fungicidal effects of pyroligneous acid.]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 96, 1957 (129–44). 7 refs. [Jap.jap.e.*e*.]

Describes the inhibiting effect of the vapour and of various fractions of pyroligneous acid (p.a.) at various concentrations and durations, after passing through 3 depths of soil, and in various soils, on the mycelial growth and germination of several fungi. The vapour of acetic acid in the same concentration but in another diluent had similar effects. The fungicidal effects are not particularly strong but p.a. penetrates the soil fairly well to a limited depth. Lack of success with p.a. in certain nurseries may be due to dominance of *Fusarium oxysporum*, a more resistant species.

578. TRUMAN, R., and CARTWRIGHT, J. B. **The use of seed dusts to reduce losses due to pre-emergence damping-off in *Pinus radiata*.** *Tech. Notes For. Comm.* (*Div. Wood Technol.*) *N.S.W.* 10 (3/4), 1957 (1–2). 8 refs.

In replicated greenhouse tests, 15 out of 17 fungicidal dressings gave increased emergence. In field tests with thiram, ziram, Hexcebunt and Tetroc (tetrachloro-*p*-benzoquinone) (the most promising preparations in the first test) all gave significant increases in emergence. Any of the first

3 dusted at 4 oz./50 lb. seed before sowing is recommended. The results apply only to *P. radiata*.

579. GIBSON, I. A. S. **Saprophytic fungi as destroyers of germinating Pine seeds.** *E. Afr. agric. J.* 22 (4), 1957 (203–6). 15 refs.

Losses of seeds of *Pinus patula* associated with damage to the seed-coat are shown to be due to invasion by saprophytic seed-borne fungi. Seed destruction appears to depend largely on growth rate, and resistance increases as the seedlings germinate. It is suggested that germination losses in Pine seeds after mechanical de-winging may be due to fungal invasion facilitated by minute damage incurred in the process, and care is recommended in the handling of Pine seeds. *From author's summary.*

580. ERNSTSON, M. Bekämpning av fallsjuka i sådder av tall och gran. **[Control of damping off of Pine and Spruce seedlings.]** *Skogen* 44 (18), 1957 (581). [Sw.]

$Ca(NO_3)_2$ was applied to affected seedbeds at the rate of 100 kg./ha. After 2 days the attack had ceased and there was no recurrence within 4 weeks.

581. GEORGESCU, C. C., and PETRESCU, M. Contribuţii la studiul bolii 'opăreala sub zăpadă a puieţilor de răşinoase' produsă de *Discosia pini* Heald. **['Snow scald of conifer seedlings' caused by *D. pini*.]** *Rev. Pădurilor* 1956 (1), (36–8). [Rum. rum.russ.]

Discusses in general the condition known as 'snow scald'. Three species of fungus (*Herpotrichia nigra*, *Rosellinia byssiseda* and *Discosia pini*) are commonly isolated from affected seedlings. The author describes the morphology and behaviour of *D. pini* and indicates control measures.

582. GEORGESCU, C. C., and MOCANU, V. Tracheomicoza puieţilor de stejar. **[A tracheomycosis of *Quercus robur* seedlings.]** *Rev. Pădurilor* 1956 (9), (598–9). 8 refs. [Rum.russ.g.]

Describes a new disease of Oak seedlings, a wilt caused by *Fusarium oxysporum*, observed in nurseries in Rumania and the U.S.S.R.

583. PETRESCU, M. Antracnoza puieţilor de *Ligustrum vulgare* L., produsă de ciuperca *Glomerella cingulata* (Stone.) Spauld. et Schrenk. **[Anthracnose of *L. vulgare* seedlings caused by the fungus *G. cingulata*.]** *Bul. şti. Acad. Repub. rom.* (*Sect. biol.*) 8 (4), 1956 (755–68). 6 refs. [Rum.russ.f.] O.R.S.

584. ITO, K., and SHIBUKAWA, K. **Studies on some anthracnoses of woody plants—IV. A new anthracnose of *Acacia* with special reference to the life history of the causal fungus.** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 92, 1956 (51–64 + 10 photos). 7 refs. [E.e.jap.]

Covers symptoms and morphology of the conidial (*Colletotrichum*) and ascigerous (*Physalospora*) stages, proof of genetical connexion and pathogenicity, taxonomy, description of *Physalospora acaciae* sp. nov., and its physiological reactions. The fungus attacks the aerial parts, causing severe mortality in nursery stock of *A. dealbata*. Similar susceptibility in Black Wattle was shown by inoculations.

585. SATO, K., and SHOJI, T. **[Pathogenicity of *Rhizoctonia solani* Kühn isolated from graminaceous weeds in forest nurseries.]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 96, 1957 (89–104 + 56 photos). 34 refs. [Jap.jap.e.*e*.]

The virulence of 16 isolates of this fungus, collected from damping-off in *Pinus densiflora*, root-rot in *P. thunbergii*, web-blight in *Robinia pseudo-acacia* and *Alnus* spp. and leaf and sheath spots and blights in 11 grasses, to others of these hosts and to *Amorpha fruticosa* was studied in inoculated sowings. Several of the isolates from grasses, and those from *P. densiflora* and *Robinia*, caused severe damping off in Pine seedlings. The statement that *R. solani* is never virulent to the host from which it is isolated is not supported.

443.3. Diseases of Older Stages

Stem, Butt and Root Rots; Root Diseases

See also Nos. 292, 412, 604, 1091.

586. WAID, J. S., and WOODMAN, M. J. **A non-destructive method of detecting diseases in wood.** *Nature, Lond.* 180 (4575), 1957 (47). 1 ref.

Ultrasonic equipment has been used by the T.D.A. for detecting flaws in wood [cf. *F.A.* 18 p. 146], and its possible development for determining the presence of diseased tissues has been suggested. In the trials reported, transmission of ultrasonic energy through wood was measured both down and across the grain, and it was found to be considerably reduced when even slight defects were present. No transmission could be obtained through 5 cm. of Pine infected with dry rot, though ultrasonic energy could be transmitted through 130 cm. of sound seasoned Beech. It is suggested that this method might be employed to detect standing trees infected with butt or heart rots.

587. **[Heartrot in bottomland hardwoods related to fire damage.]** *Rep. Sth. For. Exp. Sta. 1956*, 1957 (57–8). 1 ref.

Of > 1000 trees examined, 40% showed butt rot, mostly attributable to fire injury. Rot development varied with species, and could be estimated from size, appearance, and age of the wound. Of the 7 species or groups examined, initial development of rot was fastest in Sweetgum and Elm, slowest in Bitter Pecan and about medium for Red Oak [cf. *F.A.* 18 No. 3012].

588. BASHAM, J. T. **The deterioration by fungi of Jack, Red, and White Pine killed by fire in Ontario.** *Repr.* from *Canad. J. Bot.* 35, 1957 (155–72 + 17 photos).

After a fire in 1948, in the Missisagi region of Ontario, 10 plots of ½ to 2 acres were established in stands of *Pinus banksiana*, *P. resinosa*, and *P. strobus*, and merchantable trees were felled and examined between 1950 and 1953. After 5 years, extensive blue and brown sapwood stains were observed in all species; most of the sapwood was affected by rot and in some cases this extended to

the heartwood. The fungi isolated most consistently were *Peniophora gigantea*, *Polyporus anceps* and *Polyporus abietinus* from white sapwood rots, and *Fomes pinicola* and *F. subroseus* from brown sapwood rots. There was a significant increase in the volume of heart rot, associated chiefly with *Fomes pini*, over that observed in living Pine over a similar period. The average rate of radial penetration of visible deterioration was significantly faster in trees with wide annual rings than in slow-growing trees. [Cf. *F.A.* 17 No. 4067.]

589. ENGELHARDT, N. T. **Pathological deterioration of looper-killed Western Hemlock on Southern Vancouver Island.** *For. Sci.* 3 (2), 1957 (125–36). 11 refs.

[Cf. *F.A.* 16 No. 3196.] The 1944–46 outbreak of *Lambdina fiscellaria lugubrosa* collapsed in the latter year, taken as year 0 in the study. About 50,000 acres of mature and over-mature Hemlock, Douglas and Amabilis Fir and Sitka Spruce were severely defoliated. The % of gross volume lost through felling breakage and rots of sap- and heartwood in the years 0–7 after death through defoliation, and the fungi responsible, are investigated in detail. Losses in years 2, 4, and 7 respectively were: sapwood rot 19, 36, and 67%; breakage 3, 6, and 9%; total loss (including an average of 24% heartrot) 46, 66, and 100%. Sapwood penetration by fungi up to year 2 was slight and affected wood would be largely removed in slabbing logs. Of 10 named fungi, *Fomes pinicola* caused 64, 83 and 86% of the total volume loss through decay in the years named. Where heavy mortality is expected, salvage should begin immediately.

590. ETHERIDGE, D. E. **Comparative studies of *Coryne sarcoides* (Jacq.) Tul. and two species of wood-destroying fungi.** *Repr.* from *Canad. J. Bot.* 35, 1957 (595–603 + 1 photo). 9 refs.

On the basis of laboratory tests, *C. sarcoides* does not appear capable of causing decay, but its presence in heartwood may affect the progress of decay by its antagonism to wood-destroying fungi. The antagonism of one isolate of *C. sarcoides* reduced the decay caused by *Coniophora puteana* and *Polyporus tomentosus* by 50 to 75%. *From author's summary.*

591. BAZZIGHER, G. Tannin- und phenolspaltende Fermente dreier parasitischer Pilze. **[Enzymes breaking down tannins and phenols, found in three parasitic fungi.]** *Phytopath. Z.* 29 (3), 1957 (299–304). 6 refs. [G.g.e.] O.R.S.

[Cf. *F.A.* 17 No. 4108.] *Endothia parasitica*, *Herpotrichia nigra* and *Fomes annosus* were found, *in vivo* and *in vitro*, to show esterase and pyrogallase activity. These enzymes were responsible for the breakdown of tannins, gallic acid and various phenols, which would appear to exclude these substances as factors in disease resistance of the hosts. Both enzymes were relatively stable over a wide range of temperatures.

592. NISSEN, T. V. **Soil actinomycetes antagonistic to *Polyporus annosus* Fr.** *Friesia, København* 5 (3/5), 1956 (332–9). 19 refs. [E.e.] I.M.I.

Of 18 actinomycete species isolated from Danish woodland soil, 8 proved to be antagonistic to *Fomes annosus* in vitro. One species (*Streptomyces* sp.) showed a pronounced inhibiting effect on this fungus in experiments with sterilized soil. The possibility is discussed of controlling *F. annosus* by green manuring, so as to alter or stimulate the actinomycete flora of the soil in a direction adverse to it. *From author's summary.*

593. GARRETT, S. D. **Effect of a soil microflora selected by carbon disulphide fumigation on survival of *Armillaria mellea* in woody host tissues.** *Canad. J. Microbiol.* 3 (2), 1957 (135–49). 24 refs. O.R.S.

Laboratory tests confirmed Bliss's hypothesis [*Phytopathology* 41, 1951 (665–83)] that, when CS_2 is used to fumigate tree roots, *A. mellea* is killed through the agency of *Trichoderma viride*, which is relatively tolerant and becomes dominant in the treated soil. Higher doses of the fumigant tended to select still more resistant fungi, e.g. ascosporic penicillia of the *Penicillium lutea* series. It also seems, however, that the fumigant damages at least the peripheral mycelium of *A. mellea* in woody host tissues and so facilitates invasion by *T. viride* and/or other fungi.

594. MARINKOVIĆ, P., and MARINKOVIĆ, B. Uticaj drvne truleži na kvalitet jedne izdanačke šume hrasta lužnjaka u Sremu. **[The influence of wood rot on the quality of Oak coppice in Srem.]** *Šumarstvo* 10 (3/4), 1957 (168–78). 17 refs. [Serb.e.f.]

At Ogar, Lower Srem, a 110-year coppice stand of Oak on a poorly drained site was clear-felled; 100 trees were taken from a sample plot, graded provisionally by size and form, and then cut up and re-graded with regard to wood quality. Results are tabulated. Loss through decay is estimated at ca. 30% of the total yield. The most important wood-rotting fungi were *Polyporus sulphureus* and *P. dryophilus*. The authors emphasize that decay should be taken into account in determining the rotation.

595. SPIRCHEZ, Z., SILAGHI, G., and POPESCU, V. Un atac de *Laetiporus sulphureus* (Fr. ex. Bull) Bond. et Sing. pe castanul comestibil (*Castanea vesca* Mill.). **[*Polyporus sulphureus* on *Castanea sativa*.]** *Rev. Pădurilor* 1956 (10), (670–2). 23 refs. [Rum.]

Describes this disease, which has recently attacked Chestnut plantations in Rumania.

Wilts, Diebacks etc.

596. CAPRETTI, C. *Diplodia pinea* (Desm.) Kickx agente del disseccamento di varie specie del gen. *Pinus* e di altre conifere. **[*D. pinea*, a cause of dieback in various species of *Pinus* and in other conifers.]** *Ann. Accad. ital. Sci. for.* 5, 1956 (171–202 + 21 photos). 77 refs. [It.f.]

Discusses morphology and taxonomy of the fungus, lists its synonyms, describes artificial cultures, and its behaviour both as a parasite and as a saprophyte. A list is given of 39 hosts (including 30 *Pinus* spp.), indicating country, date, and author of first records.

597. ROBAK, H. **Some fungi occurring on died-back tops and branches of *Picea abies* and *Abies* spp. in Western Norway.** *Friesia, København* 5 (3/5), 1956 (366–89). 28 refs. [E.e.] I.M.I.

Describes 28 species that could be identified. A larger number could not be identified. It is evident that the dead bark of conifers is invaded by a far greater number of fungi than those known to fructify on the species in question. Repeated isolations of *Phomopsis pseudotsugae* from Norway Spruce is a striking example of a fungus whose hosts probably include many more species than might be concluded merely from the occurrence of its fructifications in nature.

598. HAHN, G. G. ***Phacidiopycnis* (*Phomopsis*) canker and dieback of conifers.** *Plant Dis. Reptr.* 41 (7), 1957 (623–33). 23 refs. A.P.B.

The causal agent of the canker-dieback of Douglas Fir, Larch and other conifers, originally called *Phomopsis pseudotsugae*, is now identified as *Phacidiopycnis pseudotsugae*, the imperfect stage of a new species, *Phacidiella coniferarum*. Despite world-wide distribution of the *Phacidiopycnis* stage, the complete life-cycle of the pathogen has been found only in the N.E. United States on White Pine. Symptoms of the disease on different conifers under conditions of natural infection are described. In the U.S.A. the disease is identified with the so-called 'Phoma' disease of White Pine saplings. It has not been found in native Douglas Fir stands. Positive inoculations with *P. pseudotsugae* are described on *Abies fraseri*, *Larix leptolepis*, *Picea abies*, *P. glauca*, *P. pungens*, *Pinus strobus*, *Pseudotsuga taxifolia*, *P. taxifolia* var. *glauca*, and *Tsuga canadensis*. Infection took place during the autumn and early spring, but not during the summer. The damage caused to trees is discussed and procedures are outlined for prevention and control. *From author's summary.*

599. BOYCE, J. S., JR. **Oak wilt spread and damage in the Southern Appalachians.** *J. For.* 55 (7), 1957 (499–505). 16 refs.

Gives an account of centres and the spread of infection. The incidence of root-grafting and control measures are discussed.

600. BRETZ, T. W., and JONES, T. W. **Oak flowers may serve as infection courts for the Oak wilt disease.** *Plant Dis. Reptr.* 41 (6), 1957 (545). A.P.B.

Experimental inoculations with the Oak wilt fungus through wounds in the stigma of ♀ flowers suggest that infections may occur through injured flowers.

601. BRETZ, T. W., and BUCHANAN, W. D. **Oak wilt fungus not found in acorns from diseased trees.** *Plant Dis. Reptr.* 41 (6), 1957 (546). A.P.B.

The fungus was not recovered from mature or nearly mature acorns from infected *Quercus velutina*, but embryos from such acorns (unlike those from healthy trees) showed immediate germination activity in culture dishes and some 'scar' tissue developed at points of injury to the cotyledons.

602. BUCHANAN, W. D. **Brenthids may be vectors of the Oak wilt disease.** *Plant Dis. Reptr.* 41 (8), 1957 (707–8). A.P.B.

Arrhenodes minuta is known to visit Oak wilt fungus mats and fresh wounds on Oak trees, and also to bore into the xylem of living trees for oviposition. Field observations and laboratory tests suggest that it may be a vector of the disease.

603. ZUCKERMAN, B. M. **Effect of X-rays on the germination of conidia of the Oak wilt fungus.** *Phytopathology* 47 (6), 1957 (361–4). 8 refs.

Dosages of medium-hard X-rays that inhibited secondary spore formation by conidia in *Endoconidiophora fagacearum* did not affect germ-tube formation. At higher dosages, abortive tubes developed from conidia and then ceased growing. As dosages increased the number of conidia that germinated decreased and the time interval to germination and secondary spore formation increased. *From author's summary.*

604. TURK, F. M. **The biological relationship between the Oak wilt pathogen, *Endoconidiophora fagacearum* Bretz, and the fungi found in wilted Oak trees.** *Abstr. of thesis*, in *Dissert. Abstr.* 17 (3), 1957 (459). O.R.S.

Many wood-rotting and other fungi were isolated from 27 trees killed by Oak wilt a year earlier. There appeared to be no difference in the kinds of fungi, whether the trees were left standing, felled, or treated with PCP. A total of 28 fungi was isolated from 150 Red Oaks dead 1–4 years, none of which yielded *E. fagacearum*. The sap-wood of trees dead 15–48 months and the heartwood of those dead 24 months or longer was decayed. In trees that had wilted at the same time, decay was more advanced in those with higher moisture content. Those with more bark remaining showed more decay than those with less bark. *E. fagacearum* survived 10 months in felled or standing wilted trees, and was never isolated when m.c. was $< 35\%$, or from trees heavily infected with *Nummularia bulliardi* even at m.c. $> 40\%$. It survived in wood blocks from infected trees for over 32 days when stored at 3° C. and for less than 1 day at 35°. Of 31 fungi tested for their antibiotic effect against *E. fagacearum*, 8, including *Trichothecium roseum* and *N. bulliardi*, proved to be inhibitory.

605. WEBER, G. F. **Vascular wilt of Mimosa in Florida.** *Plant Dis. Reptr.* 41 (7), 1957 (640–2). 2 refs. A.P.B.

A fungus isolated from roots, branches and twigs of *Albizzia julibrissin* suffering from wilt, compared well with descriptions of *Fusarium oxysporum* f. *perniciosum*.

606. BAKSHI, B. K. **Wilt disease of Shisham (*Dalbergia sissoo* Roxb.). IV. The effect of soil moisture on the growth and survival of *Fusarium solani* in the laboratory.** *Indian For.* 83 (8), 1957 (505–11). 2 refs.

F. solani was found to survive best in sterile loam soils with m.c. up to 20%, and to decline rapidly with increasing soil m.c. above that level. This, together with the fact that *D. sissoo* thrives well in irrigated plantations, suggests that the wilt disease could be controlled in affected areas by irrigation. [Cf. *F.A.* 17 (No. 2967).]

607. PRENDERGAST. **Observations on the epidemiology of vascular wilt disease of the Oil Palm (*Elaeis guineensis* Jacq.).** *J. W. Afr. Inst. Oil Palm Res.* 2 (6), 1957 (148–75). 19 refs.

Describes more fully than has previously been done, the symptoms and spread of this disease caused by *Fusarium oxysporum*, which also attacks other species, and discusses the influence of K deficiency on the incidence of the disease. [Cf. *F.A.* 13 No. 3983).]

608. ENGELHARD, A. W. **Host index of *Verticillium albo-atrum* Reinke and Berth. (including *Verticillium dahliae* Kleb.).** *Plant Dis. Reptr.*: *Suppl.* No. 244, 1957 (23–49). A.P.B.

Cankers, Stem Rusts etc.

See also Nos. 591, 597–8.

609. COHEN, L. I., and WATERS, C. W. **Some observations of an undescribed disease of Ponderosa Pine twigs.** *J. For.* 55 (7), 1957 (515–7). 4 refs.

Galls on Ponderosa Pine twigs near Missoula, Montana, were examined and are described. Anatomical studies revealed dark septate hyphae growing in the cortex, pith and xylem of the host. In several instances the xylem cylinder was in a state of advanced decay or completely destroyed, the decay often extending to larger branches. The formation of galls could not be attributed to a particular organism. *From authors' summary.*

610. PEACE, T. R. **Recent observations on the rusts of Pine in Britain.** Forestry Commission, London. 1957. pp. 5. 4 refs. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

An account of the present status of 5 species of rust which affect trees of the genus *Pinus* in Great Britain.

611. BARBER, J. C., DORMAN, K. W., and BAUER, E. **Slash Pine progeny tests indicate genetic variation in resistance to rust.** *Res. Note Stheast. For. Exp. Sta.* No. 104, 1957. pp. 2.

Examination in 1955 of plantings made in 1952 and 1953, showed significantly fewer cases of infection in the progeny of certain open-pollinated mother trees selected for resistance to *Cronartium fusiforme*, than in controls (4 different lots of seedlings). One tree in particular had offspring with an infection rate $< \frac{1}{2}$ that of the controls.

612. **[Fusiform rust.]** *Rep. Sth. For. Exp. Sta. 1956*, 1957 (59).

The first symptom of the infection of nursery seedlings was the development of red spots on the needles. This early symptom was well correlated with the development of typical fusiform swellings on the stems several months later.

613. GOGGANS, J. F. **Reducing losses from southern fusiform rust.** *Leafl. Ala. agric. Exp. Sta.* No. 54, 1957. pp. 4.

A study of *Cronartium fusiforme* infection was made in 5- to 16-year-old plantations of Slash, Loblolly and Longleaf Pines that had never been cut. There was no important difference in the amount of infection on Slash and Loblolly, but Longleaf had much less. The year of planting strongly influenced the amount of infection found: some year's plantings had an average amount of infections whereas others had large or small amounts. A good or bad year was the same for all species. The % of infected trees decreased as the number of trees per acre increased. The amount of infection in plantations increased as the rate of height growth increased. Plantations on good sites grew faster and had more rust than plantations on poor sites.

614. MOSS, V. D. **Actidione treatment of blister rust trunk cankers on Western White Pine.** *Plant Dis. Reptr.* 41 (8), 1957 (709–14). 6 refs. A.P.B.

Tests were made of several substances for application to cut surfaces after excision of stem cankers, with a view to killing mycelium on the perimeter of the wounds. Substances tested were Actidione, endomycin, and Ca sulphamate. Actidione concentrations of 150, 300 and 600 p.p.m. were about equally effective in killing all structural stages of the rust, giving kills of 83, 77 and 80% respectively. Because of the weak penetration of Actidione into the bark from the margin of wounds, the cut surface should extend above mycelial extent in the distal end of cankers and to the edge or slightly beyond the lower and lateral outer limits of surface discoloration. Bark removed to expose mycelium should not exceed half the circumference of the stem at any point. When the margin of a canker extends beyond this limit, bark at the edge or slightly beyond the lateral outer limits of surface discoloration should be slit longitudinally to expose the mycelium. Endomycin and calcium sulphamate were not effective.

615. NAKAMURA, K., and MITSUHASHI, K. **Anatomical characters of gall-wood caused by *Cronartium quercuum* on Akamatsu (*Pinus densiflora*).** *Bulletin of the Faculty of Agriculture, Tokyo University of Agriculture and Technology* 1 (2), 1953 (11–6 + 4 photos, 1 dgm.). 4 refs. [E.]

616. GRASSO, V. Nuovi rinvenimenti di ospiti con *Coryneum cardinale.* **[Newly discovered hosts of *C. cardinale.*]** *Ital. for. mont.* 12 (2), 1957 (99–100). [It.]

Records the occurrence of *C. cardinale* in Italy on *Cupressus lusitanica*, *C. macrocarpa* and *C. arizonica.*

617. BJÖRKMAN, E. Norrländsk tallkräfta (*Dasyscypha fuscosanguinea*) i sådder, och planteringar i höjdlägen. **[The 'Norrland Pine canker' (*D. fuscosanguinea*) in sown and planted forests in the mountains.]** *Skogen* 44 (16), 1957 (522). [Sw.]

Damage tends to be heavy in thinned stands at altitudes of 400–700 m. in which *Lophodermium pinastri* has already killed many trees. *D. fuscosanguinea* is a wound parasite and the point of infection is often the root collar damaged by frost heaving.

618. MANNERS, J. G. **The relationship between Larch canker, *Trichoscyphella* and frost.** *Rep. For. Res. For. Comm., Lond. 1955/56*, 1957 (88–9).

Pot plants of *Larix decidua* of 3 provenances were locally damaged by a cold-air stream, some

were then exposed to *Trichoscyphella* [*Dasyscypha*] *wilkommii* infection, and one set was frozen while wet. Cankers, frost cracks, and dieback of laterals occurred in trees locally frozen. It is too soon for infection to have appeared on the inoculated trees, but more cankers have appeared on them than on the uninoculated. Wetness of the bark intensified frost damage, which was more severe on Alpine than on Sudeten or Polish strains of Larch.

619. OGANOVA, È. A. K biologii gribov, vozbuditelej rakovyh boleznej jasenja. **[The biology of fungi causing cankers of Ash.]** *Soobšč. Inst. Les.* No. 3, 1954 (54–63). 16 refs. [Russ.]

Deals with *Endoxylina astroidea*, *Libertella fraxinea*, *Hysterographium fraxini*, *Cytospora pruinosa*, *Strickeria trabicola*, *Daldinia concentrica* and *Peniophora cinerea*, on the basis of observations in the Tellerman Forest, cultures, and literature. Cankers were found to occur much more frequently in excessively thinned young stands (crown density 0·4–0·6) than in stands unthinned or thinned to normal crown density (0·7–1·0).

620. ***Dothichiza populea* Sacc. and Briard.** *Distr. Maps Plant Dis.* No. 344 (rev.) 1957. pp. [2].

621. WATERMAN, A. M. **Canker and dieback of Poplars caused by *Dothichiza populea*.** *For. Sci.* 3 (2), 1957 (175–83). 20 refs.

Inoculations of 92 clones, representing 38 hybrids with Black or Balsam Poplars as parents, showed 75 clones to be moderately or highly susceptible. The *Tacamahaca* and *Aegeiros* groups are especially affected. Branch and stem cankers from natural infection were found in a plantation on *P. nigra* var. *italica*, *P. deltoides*, *P.* × *robusta*, *P.* × *petrowskyana*, *P. tristis*, *P. charkoviensis*, 'Volga Poplar', *P. charkoviensis* × *P. deltoides*. The view that *Cenangium populneum* is the perfect stage is not supported either by cultures or inoculations. The disease in the United States affects only nursery and plantation trees. The planting of disease-free stock in the best possible growing conditions is advised.

622. BUTIN, H. Untersuchungen über Resistenz und Krankheitsanfälligkeit der Pappel gegenüber *Dothichiza populea* (Sacc. et Br.). **[Studies on the resistance and susceptibility of Poplar to *D. populea*.]** *Phytopath. Z.* 28 (4), 1956 (353–74). 23 refs. [G.g.] O.R.S.

Susceptibility to attack in sections 1 cm. thick cut from stems or branches of 4- to 5-year plants of *Populus deltoides* increased with decreasing turgescence. At 20° C. the increase began with a water loss of 10% of the total water content for *D. populea* and 20% for *Cytospora chrysosperma*. It also increased at temperatures of 8° and 4° compared with higher temperatures. A combination of high water loss and low temperature increased the attack, but high temperature counterbalanced to some extent the effect of high water loss and vice versa. The intracellular spread of the fungus in the bark is preceded by the diffusion from the hyphae of toxic metabolic products; it is most rapid with a water loss of 41%. The formation of a wound periderm with lignification and a cork layer increase resistance to the spread of infection.

623. SCHÖNHAR, S. Ein Beitrag zur Frage der Anfälligkeit verschiedener Pappelarten und Pappelsorten gegen *Dothichiza populea*. **[The susceptibility of various Poplars to *D. populea*.]** *Mitt. Ver. forstl. Standortskunde ForstpflZücht.* No, 6, 1957 (59–62). 4 refs. [G.]

Reports on a continuation of field inoculation trials [see *F.A.* 15 No. 2643], with some further varieties and hybrids. *Populus nigra* var. *italica* and *P. simonii* were least resistant, followed by *P. alba* and *P. alba* × *P. tremula*, but even in the most resistant variety, *P.* × *regenerata*, about half the inoculated plants showed marked injuries. Though infection rates varied over the years and with times of inoculation, the ranking remained fairly constant. Injuries were markedly more severe in the second growing season, after inoculation. Inoculation in the dormant period was possible. In the pot experiments with *P.* × *regenerata* and *P. trichocarpa*, infection rates were equal for both under moist or very moist conditions, but under dry conditions, more *P. trichocarpa* were infected, and injuries were more severe.

624. ŽIVOJINOVIĆ, D. Sušenje topola na Deliblatskoj Peščari. **[Poplar mortality on the Deliblatska Peščara.]** *Šumarstvo* 9 (11/12), 1956 (721–4). 5 refs. [Serb.e.f.]

Records heavy mortality in 1956 in 3- to 5-year Poplar plantations as a result of attack by *Dothichiza populea*. The trees had suffered frost damage 3 months earlier. Damage was greatest to *P.* × *robusta*, *P.* × *serotina* and *P. nigra* var. *italica*. The most resistant were *P. alba*, *P. nigra* and *P.* 'Bachofeni'.

625. BRAUN, H., and HUBBES, M. Sporeninfektion und Antagonismus bei *Dothichiza populea*. **[Spore infection and antagonism in *D. populea*.]** *Naturwissenschaften* 44 (11), 1957 (333). [G.] O.R.S.

Healthy plants from cuttings of *Populus* × *robusta* sprayed with a spore suspension and kept at controlled temperatures, became infected, showing that the fungus can enter through the buds and shoot tips; this was confirmed by field observations. The fungus in culture had a strong antibiotic effect on *Penicillium* cf. *citrinum*. Young Poplar shoots standing in a culture filtrate of the fungus lost their leaves after 60 hours, while controls in a nutrient solution retained them. When cultured on a nutrient solution (Poplar bark extract) the fungus coloured the liquid, the degree of coloration (yellow to dark brown) varying with the strain of fungus. No relation between the colour and the antibiotic effect was found. A more detailed account will be published.

626. PESCHAUT, R. Einige Worte über den Pappelanbau in Österreich. **[Notes on Poplar-growing in Austria.]** *Allg. Forstztg.* 68 (7/8), 1957 (89–90). [G.]

General hints on sites, cultivation etc., with a note on trials of a fungicide, 'Funguran', in a young

plantation where deaths from *Dothichiza populea* were reduced from 16% on control plots to 5% on stands sprayed in May, and 1% on stands re-sprayed in October.

627. BOLLER, A. *et al.* Diaporthin, ein Welketoxin aus Kulturen von *Endothia parasitica* (Murr.) And. **[Diaporthin, a toxin causing wilting, from cultures of *E. parasitica*.]** *Helv. chim. Acta.* 11 (3), 1957 (875–80). 5 refs. [G.g.] O.R.S.

628. GÄUMANN, E., and NAEF-ROTH, S. Über die Toxine der *Endothia parasitica* (Murr.) And. **[The toxins of *E. parasitica*.]** *PflSchBer.* 19 (1/9), 1957 (9–16). 12 refs. [G.g.e.] C.G.B.

Observations on two toxins, diaporthin and skyrin, isolated from *E. parasitica*. Skyrin is also synthesized by *Penicillium islandicum*. Both toxins act on young tomato shoots mainly as a stem poison. *From authors' summary.*

629. SCHIPPER, M. A. A., and HEYBROEK, H. M. Het toetsen van stammen van *Nectria cinnabarina* (Tode) Fr. op levende takken *in vitro*. **[Testing strains of *N. cinnabarina* on living branches *in vitro*.]** *Tijdschr. PlZiekt.* 63 (4), 1957 (192–4). 4 refs. [Du.e.] E.M.B.

Several twigs of *Ulmus* 'Christine Buisman' and *Acer* sp. disinfected and exposed to cultures of the fungus, were rapidly killed by virulent but not by non-virulent strains. The method is suitable for selecting virulent strains for use in testing the resistance to *N. cinnabarina* of Elm hybrids resistant to Dutch Elm disease.

630. ***Pseudomonas syringae* van Hall.** *Distr. Maps Plant Dis.* No. 336, (rev.) 1957. pp. [2].

Foliage Diseases

See also Nos. 591, 610, 749.

631. MORIONDO, F. Ricerche sulla *Melampsora pinitorqua* Rostr. in Italia. **[*M. pinitorqua* in Italy.]** *Ann. Accad. ital. Sci. for.* 5, 1956 (263–82 + 8 photos, 6 gphs.). 40 refs. [It.f.]

Reviews the literature and the author's own studies. [Cf. *F.A.* 16 Nos. 1901, 1931; 17 No. 2981; 18 No. 3037.]

632. GRASSO, V. I *Gymnosporangium* di alcuni boschi della Toscana e le loro forme picno-ecidiche. **[The *Gymnosporangium* species occurring on some trees in Tuscany and their pycno-aecial forms.]** *Ann. Accad. ital. Sci. for.* 5, 1956 (21–89 + 77 photos). 170 refs. [It.f.]

A detailed and fully documented study, distinguishing 3 species: (1) *G. juniperinum* on *Juniperus communis* (aecial forms on *Pyrus malus* and *Sorbus* spp.) (2) *G. clavariaeforme* on *J. communis* and *J. macrocarpa* (aecial forms on *Crataegus oxyacantha*), and (3) *G. sabinae* on *J. communis*, *J. oxycedrus*, *J. phoenicea*, *J. sabina* (aecial forms on *Pyrus communis* and *Cydonia vulgaris*). The distinction between (2) and (3) is not certain.

633. DURRIEU, G. Influence du climat sur la biologie de *Phaeocryptopus gäumannii* (Rohde) Petrak parasite du *Pseudotsuga*. **[Influence of the climate on the biology of *P. gaeumannii*, a parasite of *Pseudotsuga*.]** *C.R. Acad. Sci., Paris* 244 (16), 1957 (2183–5). 1 ref. [F.f.] O.R.S.

A study of climates in regions where Douglas Fir occurs naturally or has been introduced, suggests that high rainfall in summer, when the fungus fructifies, favours spore germination and successful attack.

634. KOBAYASHI, T. **[Another sclerotial disease of Japanese Cedar, *Cryptomeria japonica*, caused by *Sclerotinia libertiana*.]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 96, 1957 (1–16 + 27 photos). 32 refs. [Jap.jap.e.*e*.]

This fungus (syn. *S. sclerotiorum*), killing shoots of *Cryptomeria* in warm localities, is distinct from *S. kitajama*, a disease of *Cryptomeria* in snowy regions. The symptoms, morphology and physiology are detailed. Inoculations show it to be a serious disease also of *Pinus densiflora* and *Larix leptolepis*. *Chamaecyparis obtusa* is highly resistant.

635. KOBAYASHI, T. **[Studies on the shoot blight disease of Japanese Cedar, *Cryptomeria japonica* D. Don, caused by *Guignardia cryptomeriae* Sawada.]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 96, 1957 (17–36 + 9 photos). [Jap.jap. e.*e*.]

Shows that *Macrophoma sugi* is the imperfect stage of *G. cryptomeriae*, and gives the temperature requirement for mycelial growth and germination of ascospores and conidia, and moisture requirements. Wounds, probably due to stabbing by leaf apices, extended, as wind force increased, from buds and growing tips only to all parts, and infection increased with the number of wounds. Entry via stomata was also observed.

636. ITO, K., SATO, K., and OTA, N. **Studies on the needle-cast of Japanese Larch I. Life history of the causal fungus, *Mycosphaerella larici-leptolepis*.** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 96, 1957 (69–88 + 12 photos). 20 refs. [E.e.jap.]

The morphology, physiology, parasitology and taxonomy of *Mycosphaerella larici-leptolepis* sp. nov. of which the spermogonial stage is *Phoma yanokulotae* (*Phyllostrata laricis*) are detailed. Differences from *Sphaerella laricina* are tabulated. The disease, which affects older stages more than seedlings, is spreading, the destructive effect of repeated attacks being very apparent. Seven other conifers resisted inoculation.

637. ITO, K., and SHIBUKAWA, K. **Notes on some leaf-spot diseases of broadleaved trees—III. *Septoria* leaf-spot of *Alnus*.** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 92, 1956 (65–80 + 18 photos). 14 refs. [E.e.jap.]

Deals with the pathogenicity (4 species of Alder inoculated), life cycle, morphology, taxonomy, distribution and physiological reactions to temperature and pH of *Septoria alni*, which attacks both trees and seedlings (95% of 68,000 in one instance).

638. ITO, K., and KOBAYASHI, T. **Notes on some leaf-spot diseases of broadleaved trees—IV. A new species of *Sphaerulina* causing frosty mildew of**

Walnut trees. *Bull. For. Exp. Sta. Meguro, Tokyo* No. 96, 1957 (37–68 + 21 photos). 22 refs. [E.e.jap.]

This disease, not at present serious, but causing severe defoliation and marked retardation of growth, is referred to *Sphaerulina juglandis* sp. nov. (imperfect stage *Cercosporella*).

639. KUROSAWA, E., and KATSUKI, S. **Miscellaneous notes on Myrangiales from Japan, II.** *Bot. Mag., Tokyo* 69 (817/818), 1956 (315–8). 6 refs. [E.] I.M.I.

Contains descriptions of new species: *Sphaceloma picrasmae* (on leaf, petiole and stem of *Picrasma quassoides*), *S. zelkovae* (on the leaves of *Zelkova serrata*), and *S. catalpae* (on the leaves of *Catalpa speciosa*), all by Kurosawa & Katuriki, and a first report of *Elsinoë randii* on *Juglans*.

640. SALERNO, M. Un parassita fogliare di *Eucalyptus* spp. (*Cercospora eucalypti* Cooke et Massee) nuovo per l'Italia. **[A leaf disease of *Eucalyptus* spp. (*C. eucalypti*) new to Italy.]** *Ital. for. mont.* 12 (3), 1957 (112–4). 5 refs. [It.it.f.]

Found, for the first time in Europe, on *E. globulus* and *E. rostrata* in Sicily.

444. Virus Diseases

641. TOKUSHIGE, Y. **[On the oxydase of *Paulownia* affected by witches' broom.]** *Science Bulletin of the Faculty of Agriculture, Kyushu University, Fukuoka* 15 (2), 1955 (145–50). 27 refs. [Jap.e.*e.*] A.P.B.

The oxidase activity of leaves of *Paulownia* [*tomentosa*?] was 10 times that of shoots and 25 times that of roots. In diseased trees it was ca. 20% greater for leaves and 40% greater for roots, but hardly differed for shoots. The oxidase activity of an enzyme solution from healthy leaves on substrates of quinol, ascorbic acid, oxalic acid, resorcinol, catechol and pyrogallol was as 100: 245:0:0:2634:1745. [Cf. *F.A.* 18 No. 4265.]

642. TINSLEY, T. W. **The host range of Cacao viruses.** *Annual Report of the West African Cacao Research Institute 1954/55*, 1955 (30–3). E.M.B.

Natural virus infection of *Adansonia digitata* has been found in Ghana in savanna woodland far from any Cacao, and further research is necessary to determine whether the virus spread to it from another host or is primarily a virus of *Adansonia*. Another host, *Cola chlamydantha*, always occurs in association with Cacao; 6 virus strains have been isolated from it, and all produced leaf symptoms in inoculated Cacao seedlings. Laboratory tests have shown that 25 tree species, all Tiliales, are susceptible to infection with Cacao virus. A revised list of these is given.

45. Damage by Animals

451. Mammals

See also Nos. 142, 380–1.

643. **[Forest damage by wild animals.]** *Práce výzkum. Úst. lesn. ČSR* No. 7, 1954 (5–227). Many refs. [Cz.cz.russ. + e. or g.]

Contains the following papers: Indications of game damage in forest plantations (*J. Kessl, J. Vaněk* and *B. Fanta*); Some results of stomach analyses of deer (*J. Melichar*); Site classification of the roe-deer hunting district (*S. Mottl*); The resumption of Czech pheasant breeding (*J. Sekera*); Distribution of *Bubo bubo bubo* in Czechoslovakia (*J. Sekera*); Phosphorus metabolism in the Cervidae (*J. Řeřábek* and *A. Bubeník*); Use of curare in trapping deer (*J. Řeřábek* and *A. Bubeník*); The history of the protection of forests from damage by animals (*J. Čabart* and *F. Vodička*).

644. KULICKE, H. Untersuchungen über Verbreitung, Auftreten, Biologie, und Populationsentwicklung der Erdmaus (*Microtus agrestis* L.) in den Jahren 1952–1955. **[Investigations on the range, occurrence, biology and fluctuations in populations of *M. agrestis*, 1952–1955.]** *Arch. Forstw.* 5 (11/12), 1956 (820–35). 13 refs. [G.g.russ.e.]

Decreasing in density from west to east in Germany, this vole prefers moist loams with high watertables and much weed growth. Observations made during 1952–1955 indicate a 3-year period of increasing population with a probable collapse in the winter of 1956/57. Biological and morphological details are given. From pellets examined the owls *Asio flammeus, A. otus*, and *Strix aluco* are the chief predators, and cestodes, trematodes and *Taenia taeniaeformis* the chief endoparasites. [Cf. *F.A.* 16 No. 3154–5.]

645. PIRLOT, P. L. Rongeurs nuisibles aux cultures des environs du lac Kivu (Congo belge). **[Rodent pests of plantations in the neighbourhood of Lake Kivu.]** *Bull. agric. Congo belge* 48 (3), 1957 (703–29). 117 refs. [F.du.]

Presents field observations on rodent damage to Cypress (selective as to diameter) and *Eucalyptus* spp. (unselective as to diameter, selective as to species). In both cases the presence of grass (*Setaria* sp.) is associated with greater damage, for which *Otomys virotus* is chiefly responsible, though *Oenomys* sp. also plays a part.

646. TACKLE, D. **Protection of Ponderosa Pine cones from cutting by the red squirrel.** *J. For.* 55 (6), 1957 (446–7). 3 refs.

[Cf. *F.A.* 18 No. 4270.] An aluminium band 18 in. wide was effective in preventing squirrels (*Tamiasciurus hudsonicus*) from climbing, and a distance of 7–8 ft. between tree crowns should be adequate to prevent them jumping from tree to tree.

647. PIRSCH, G. Verhütung von Wildschäden im Walde durch RVS. **[Preventing deer damage in the forest with RVS.]** *Allg. Forstztg.* 67 (17/18), 1956 (237–8). 7 refs. [G.]

Summarizes experience in various parts of S.W. Germany with this preparation, a coating providing mechanical protection. It was effective against browsing and bark-scaling, durable, and not phytotoxic. [Cf. *F.A.* 17 No. 1765.]

648. SIEGEL, H. Anwendung von mechanischen und chemischen Mitteln zur Verhütung von Wildverbissschäden. **[The prevention of game damage by**

chemical or mechanical means.] *Forst u. Jagd* 6 (7; 8), 1956 (327–9; 349–51). [G.g.]

Reports on experiments made at Tharandt with repellents to protect various broadleaved and conifer species. All preparations designed to keep game away from an area by smell were failures, and those for coating parts of plants (with the exception of some tars, if carefully applied) were useless or injurious. Some mechanical barriers, e.g. a cylinder of Spruce bark, gave some protection.

649. LINDNER, A., BRANDL, M., and WYLER, E. Neue Wege der Wildschadensverhütung. [**New ways of preventing deer damage.**] *Allg. Forstztg.* 67 (17/18), 1956 (233–6). 19 refs. [G.g.]

Reports on measures tried with more or less success in a Bavarian game reserve. An ample supply of rich mixed winter feeding reinforced with a preparation containing various minerals, trace elements, and substances [not detailed] aiding digestion, practically stopped bark-scaling and reduced browsing to tolerable limits, in spite of a density of 8·5 red deer/ha., plus some roedeer.

650. BLEICHERT, VON. Einschränkung forstlicher Wildschäden durch Anlage von Grünland-Äsungsflächen. [**Reducing deer damage in the forest by providing deer pastures.**] *Aus dem Walde, Hannover* No. 1, 1957 (89–100 + 6 photos). [G.]

Discusses ways of improving existing, and creating new, pastures, by sowing palatable herbage, fertilizing etc. Small, scattered, secluded patches which will keep the animals on the move, allow them to graze by day and prevent their congregating, in large groups are recommended. Winter feeding is also essential.

651. [**Elephant damage.**] *Rep. For. Dep. Uganda 1956*, 1957 (9 + 2 photos).

Enumerations in Kibale forest have demonstrated for the first time the magnitude of elephant damage in natural forest. E.g. 81% of timber-sized *Lovoa* spp. carry severe bark damage to a height of > 6 ft., and 25% have been entirely girdled. Damage to young regeneration of *Lovoa*, *Pterygota* and *Carapa* spp. is so severe that these species are not being replaced as timber trees of good form.

452. Birds

See No. 361.

453. Insects

See also Nos. 69, 115, 142, 155, 1258.

652. HERING, E. M. Bestimmungstabellen der Blattminen von Europa einschliesslich des Mittelmeerbeckens und der Kanarischen Inseln. Band I: Pflanzengattungen A-L. [**Keys for the identification of the leaf-miners of Europe, including the Mediterranean basin and the Canary Is. Vol I. Plant genera A-L.**] Uitgeverij Dr. W. Junk, 's-Gravenhage. 1957. pp. 648.

653. HERING, E. M. Bestimmungstabellen der Blattminen von Europa einschliesslich des Mittelmeerbeckens und der Kanarischen Inseln. Band III: Neubeschreibungen von Minen-Erzeugern. Systematische Übersicht der Wirtspflanzen und der Minen-Erzeugern. Abbildungen. [**Keys for the identification of the leaf-miners of Europe, including the Mediterranean basin and the Canary Is. Vol. III. New descriptions of leaf-miners. Systematic conspectus of host plants and leaf-miners. Illustrations.**] Uitgeverij Dr. W. Junk, 's-Gravenhage. 1957. pp. 221.

654. MCCAMBRIDGE, W. F. **A record of Spruce cone insects in Alaska.** *Tech. Note Alaska For. Res. Cent.* No. 34, 1957. pp. 2.

Results of cone dissections and rearing of larvae from cones of *Picea sitchensis*, *P. sitchensis* × *lutzii* and *P. glauca* are tabulated.

655. LYONS, L. A. **Insects affecting seed production in Red Pine. III. *Eucosma monitorana* Heinrich, *Laspeyresia toreuta* Groté (Lepidoptera; Olethreutidae), *Rubsaamenia* sp. (Diptera: Cecidomyiidae), and other insects.** *Repr.* from *Canad. Ent.* 89 (4), 1957 (150–64). 15 refs.

Notes on life history, habits and natural control. Other insects dealt with are: *Rhyacionia buoliana*, *Holcocera immaculella*, *Duvita vittella*, *Moodna ostrinella*, *Recurvaria* spp., *Pityophthorus* spp. *Oscinella* sp., *Lestodiplosis*, *Leucopis* sp., *Cnemodon coxalis* and *Lycoria pauciseta*.

Insects: Natural and Biological Control

See also Nos. 679, 681, 684–6, 693, 697, 700, 703, 707, 710, 713–4, 725–6, 736.

656. GÖSSWALD, K. Über die Lebensdauer und Einsatzbereitschaft von Waldameisenkolonien. [**The expectation of life, and effectiveness, of colonies of wood ants.**] *Waldhygiene* 1 (2), 1955 (54–9). 8 refs. [G.]

Discusses the habits and bionomics, diseases etc. of various forms of *Formica rufa* and related species. For forest protection the minor or medium forms are recommended, as their nests contain several queens and can be divided to form new nests. Those of *F. rufa major*, containing only one queen, cannot.

657. GÖSSWALD, K. Bildung von Ablegern der kleinen roten Waldameise durch Nestaufteilung (Verfahren I). Bildung von Ablegern der kleinen roten Waldameise auf der Grundlage einer Massenzucht von Königinnen (Verfahren II). [**Formation of new colonies of *Formica rufa rufo-pratensis minor* by the division of nests (method I) or the breeding of queens (method II).**] *Waldhygiene* 1 (3), 1955 (83–98); 2 (2), 1957 (54–72). 13 refs. [G.]

658. GÖSSWALD, K. Über die biologischen Grundlagen der Zucht und Anweiselung junger Königinnen der kleinen roten Waldameise nebst praktischen Erfahrungen. [**The biological basis of the breeding of queens of *Formica rufa rufo-pratensis minor*, and their introduction into nests, and practical experiences in this connexion.**] *Waldhygiene* 2 (2), 1957 (33–53). 48 refs. [G.]

Deals chiefly with the biology of development of different castes and sexes as influenced by season, temperature etc., and differences between races of *Formica rufa*, and describes breeding techniques and

the results of experiments in introducing queens of *F. rufa rufopratensis minor*, which are easily bred, into colonies of other ants.

659. BRUNS, H., and SCHRADER, A. Abnahme der Kokondichte der roten Kiefernbuschhornblattwespe (*Neodiprion sertifer*) bei Nestern der roten Waldameise. **[Reduction of pupal density of *N. sertifer* near nests of *Formica rufa*.]** *Waldhygiene* 1 (2), 1955 (59–61). 7 refs. [G.]

In a period of low population density of the sawfly, in a Pine thicket in Cloppenburg district, Lower Saxony, no live pupae were found within a distance of 30 m. from 2 medium-sized nests, compared with 14 at 50 m.

660. GÖSSWALD, K., and KLOFT, W. Der Eichenwickler (*Tortrix viridana* L.) als Beute der mittleren und kleinen roten Waldameise. **[*T. viridana* as a prey of *Formica rufa rufopratensis*.]** *Waldhygiene* 1 (7), 1956 (205–15). 10 refs. [G.g.]

Two races of this ant were observed to collect great numbers of larvae, pupae and adults of *T. viridana*. During an outbreak, many ants extended their foraging range to Oaks 150 m. distant, partially abandoning Spruce aphids nearer to their nests.

661. KÖNIG, H. Über die Auswirkung künstlicher Vermehrung der kleinen roten Waldameise im Staatlichen Forstamt Münster. **[The effect of artificial propagation of colonies of *Formica rufa rufopratensis minor* in the state forest district of Münster.]** *Waldhygiene* 1 (7), 1956 (227–9). [G.]

On ca. 40 ha. of Oak, where 150 ant nests had been established since 1953, defoliation by *Tortrix viridana* was very slight in 1956, though neighbouring stands suffered severely. This is attributed to the cumulative effect of predation by the ants over a number of years.

662. SCHÜTTE, F. Eichenwickler, Waldameisen und Vögel. **[*Tortrix viridana*, wood ants, and birds.]** *Waldhygiene* 1 (7), 1956 (215–9). 3 refs. [G.]

The average amount of foliage remaining on 3 small sample plots of Oak severely attacked by *T. viridana*, of which (*a*) had protection by nesting boxes and a (natural) colony of ants, (*b*) nesting boxes only, and (*c*) was the control, was estimated at 53, 32, and 14% respectively of full foliage, with 0, 7 and 72% of trees reduced to $< 25\%$ in the lower branches. Egg density on all plots was very high; expressed in % of that on (*c*), figures for (*a*) and (*b*) were respectively 62 and 112%. Possible reasons are discussed and the preliminary nature of these studies is stressed.

663. BRUNS, H. Untersuchungen über den Einfluss von Waldameisen-Kolonien (*Formica rufa*) auf die Siedlungsdichte höhlenbrütender Vögel. **[The influence of wood-ant colonies on the density of hole-nesting bird populations.]** *Z. angew. Ent.* 40 (2), 1957 (175–81). 20 refs. [G.g.] O.H.

Test counts in 16 areas (*a*) with, and (*b*) without ant colonies, involving 2460 hatched broods over a period of 5 years, showed mean densities in conifer stands of 2·9/ha. for (*a*) and 2·5 for (*b*), and in an Oak/Hornbeam stand of 37·7 for (*a*) and 40·3 for (*b*). No conclusions on the role of the ants either as bird food or as competitors for such food can yet be drawn.

664. BRUNS, H. Beiträge zur Kenntnis der wissenschaftlichen Grundlagen und zur Methodik des Vogelschutzes in der Forstwirtschaft. **[On the scientific basis and the methods of bird protection in forestry.]** *Waldhygiene* 2 (1), 1957 (4–30). 42 refs. [G.]

Summarizes chiefly the authors' own (published and unpublished) experimental work on the population densities obtainable in various types of forests, the effect of size, composition, structure and aspect, the availability of food (particularly the generally favourable influence of ant colonies) and water, the best types of nesting box, their distribution, placing, protection etc., and the effect of bird protection on insect populations (*Tortrix viridana*, *Dasychira pudibunda* etc.). None of the last-named investigations has yet led to conclusive results.

665. TURCEK, F. J. Über die Vernichtung einiger Samenschädlinge durch Meisen. **[The destruction of some seed pests by tits.]** *Waldhygiene* 2 (1), 1957 (1–3). 3 refs. [G.]

Ca. 40–50% of *Acer pseudoplatanus* seed collected in the Polana mountains was infested with *Pammene regiana*. Of these, ca. 20% had been emptied of larvae by birds, chiefly tits of many species, which were plentiful. Tits, chiefly blue tits, also systematically attacked the larvae of *Tortrix conwayana* found in ca. 28% of the seed of 7 *Fraxinus* species examined at the forest garden of Banská Stiavnica. They were also found feeding on *Lecanium corni*.

666. MANSFELD, K. Zur Vertilgung behaarter Raupen durch Singvögel. **[Hairy caterpillars as food of small birds.]** *Waldhygiene* 1 (5), 1956 (160–4). [G.]

Crop analyses, observations, and experiments have shown that far more small birds than was previously believed feed themselves and their broods on hairy caterpillars, including some of the worst forest pests. Feeding habits vary within a species. In experimental feeding, symptoms suggesting poisoning occurred in young starlings after a diet of *Euproctis chrysorrhoea*, but tits tolerated them well.

667. KOROL'KOVA, G. E. Značenie ptic v istreblenii massovyh vrednyh nasekomyh. **[The significance of birds in the control of mass outbreaks of insect pests.]** *Soobšč. Inst. Les.* No. 2, 1954 (65–106). 43 refs. [Russ.]

Reports preliminary results from observations in the Tellerman Forest in 1951. Discusses the biology of *Malacosoma neustria*, *Euproctis phaeorrhoea*, *Cicadetta montana*, *Hylesinus fraxini* and, in more detail, *Lymantria dispar*. Data from observations on nests are given on the consumption of different instars of these species by birds. A supplementary table shows the daily consumption of various insects by birds of 11 species in captivity.

668. GERBER, R. Blattwespen und ihre Larven und Puppen als Vogelnahrung. **[Sawflies and their larvae and pupae as food for birds.]** *Waldhygiene* 1 (6),1956 (193–9). 43 refs. [G.]

A survey of the literature, mentioning *Diprion pini*, *Pristiphora abietina*, *Trichiosoma lucorum* and others. Of 61 species reported to feed on sawflies, cuckoos, starlings and tits are the most important.

669. GOTHE, H. Versuch einer Sommeransiedlung waldbewohnender Fledermäuse in Graf Görtzischen Forstamt Schlitz. **[Experiments in inducing forest bats to settle in summer in the Schlitz forest district.]** *Waldhygiene* 1 (6), 1956 (188–92). 12 refs. [G.]

Reports on trials, covering several years, to get bats to accept various nest boxes, so far with only partial success. The bats generally appeared to prefer warmer sites and the proximity of water and open land, and to avoid N. aspects.

670. RÜHMEKORF, E. Was ist über die forstwirtschaftliche Bedeutung der Spitzmäuse bekannt? **[What is known about the role of Soricidae in forestry?]** *Waldhygiene* 1 (2), 1955 (33–7). 17 refs. [G.]

A review of the literature, with special reference to the food of various species; although this includes many insects, among them forest pests, little can be said as yet about the usefulness of shrews in the forest.

Insects: Chemical Control (General)

See also Nos. 467, 528, 675–6, 680, 682, 689, 694–6, 699, 707–9, 711–2, 714, 717–9, 728, 739.

671. SWENSON, K. G. **Pest control in the Northwest.** *Amer. Nurserym.* 106 (5), 1957 (73–5).

Summarizes control measures for *Dichomeris marginella*, *Halisidota argentata*, *Malacosoma disstria* and *M. pluvialis*, *Rhopobota naevana ilicifoliana* and *Pulvinaria floccifera* based on investigations over 3 years at the Oregon Agricultural Experiment Station, Corvallis.

672. REISCH, J. Diesjährige Erfahrungen mit Luftfahrzeugen in der Forst- Schädlingsbekämpfung. **[Latest experience with aircraft in forest pest control.]** *Forst- u. Holzw.* 12 (17), 1957 (293–6). 8 refs. [G.]

Presents a table comparing the performances of the Cessna 170B and the Piper L4 aeroplanes and the Bel 47 Gl helicopter, and discusses the effect of size of area, topography, type of stand and pest etc. in spraying operations in S.W. Germany. Aeroplanes were generally superior (in ha./min.) in fairly large-scale spraying, but for small, irregularly shaped areas, difficult terrain, or plantations with standards, the helicopter was better, provided that the ground organization was good.

673. BUTOVITSCH, V. Die Anwendung von DDT in der Forstwirtschaft. **[The use of DDT in forestry.]** *In* P. Müller [Editor], *DDT: Das Insektizid Dichlorodiphenyltrichloräthan und seine Bedeutung*. Birkhäuser Verlag, Basel, Vol. 1, 1955. pp. 199–299. 284 refs. [G.e.] I.I.E.

A review under the main headings: (I) The reaction of forest insects to DDT; (II) Practical experiments in the control of forest pests, covering free-living insects with biting or sucking mouthparts, nest builders, miners and gall insects, bark breeders, root pests and wood destroyers, with a table listing species whose reaction to DDT has been tested, giving stage tested, formulation used, and results; (III) DDT preparations and their application in the forest, covering formulations, equipment and methods for use in forest, plantation and nursery; and (IV) the effect of DDT on the forest fauna, with a table of susceptible species.

Thysanoptera

674. GAUSS, R. Der Blasenfuss *Liothrips hradecensis* Uz., ein neuer Schädling an Weisstannen-Jungpflanzen. **[*L. hradecensis*, a new pest of young Silver Fir.]** *Holz-Zbl.* 83 (93), 1957 (1139–40). 16 refs. [G.]

Describes injuries caused by *L. hradecensis* observed since 1955 on 5- to 20-year-old natural regeneration and young transplants in various parts of the Black Forest. The insects suck on the underside of the lower third of needles and on young shoots, causing bending and yellowing and, in severe cases, shedding of the needles and brownish lesions on the shoots resembling the symptoms of *Taeniothrips laricivorus* on Larch. Plants heavily infested for 2 years died back above the point of the original attack, and some were killed. Field and laboratory observations indicated that only trees growing under shelter were attacked. The imagos emerge from their winter quarters on the young shoots early in May. Oviposition (ca. 45 eggs per ♀) takes place in May and June (at higher altitudes to July). Feeding is heaviest during the late larval stages. No certainty exists about the number of generations (though the author assumes only one), alternative hosts if any, or why the insect, long known as occurring not very frequently on broadleaved trees and herbaceous species, has suddenly developed into a serious pest of *Abies alba*.

675. VITÉ, J. P. **Attempt at simultaneous control of thrips and Larch casebearer, its fundamental principles and prospects.** *Höfchen-Briefe Bayer Pflanzenschutz-Nachrichten* (*English Edition*), *Leverkusen* 8 (1), 1955 (34–52). 5 refs. [E.] I.I.E.

Discusses life cycles, habits, injuries, and the advisability, timing and methods of individual or joint control, particularly in mixed stands, and describes experiments in joint control using cotton bandages, saturated with Metasystox, round the stems. [Cf. *F.A.* 18 Nos. 629, 3076.]

Hemiptera

See also Nos. 59, 665.

676. GENDUSO, P. Esperimenti di lotta contro gli eterotteri del nocciuolo eseguiti in Sicilia negli anni 1954–1955–1956. **[Experiments in the control of heteropterous pests of Hazel nuts in Sicily, 1954–56.]** *Sicilia agric. for.* 5 (4), 1957 (127–30). [It.]

Laboratory experiments showed that the pests (*Gonocerus acuteangulatus*, *Piezodorus lituratus*, *Rhaphigaster nebulosa*, *Nezara viridula* and *Spilostethus pandurus*) were resistant to DDT but susceptible to BHC, dieldrin, chlordane and parathion. In field experiments best control was obtained by applications of BHC in powder form from a motor duster in July and August.

677. KLOFT, W. Untersuchungen über die Tannenstammlaus *Dreyfusia piceae*. **[Investigations on *Adelges piceae*.]** *Waldhygiene* 1 (2), 1955 (49–53). 10 refs. [G.]

A discussion of the effect on the bark of *Abies alba* and *A. balsamea* of the sucking of the aphid, and the role of their different reactions on aphid population fluctuations. The aphids are not visited by ants. [Cf. *F.A.* 18 No. 3078.]

678. BUCKHORN, W. J., and LAUTERBACH, P. G. **Timing of aerial surveys for the Balsam woolly aphid [*Adelges piceae*].** *Res. Note Pacif. Nthwest. For. Range Exp. Sta.* No. 142, 1957. pp. 2.

679. BROWN, N. R., and CLARK, R. C. **Studies of predators of the Balsam woolly aphid, *Adelges piceae* (Ratz.) (Homoptera: Adelgidae). II. An annotated list of the predators associated with the Balsam woolly aphid in eastern Canada.** *Repr.* from *Canad. Ent.* 88 (12), 1956 (678–83). 8 refs.

680. TEUCHER, G. Das Auftreten der Strobenwollaus in unserer Republik. **[Occurrence of *Pineus strobi* in E. Germany.]** *Forst u. Jagd* 7 (3), 1957 (110–1). 3 refs. [G.]

Discusses bionomics etc., including observations on the lack of winged forms in E. Germany. Injuries, except on very young plants, were insignificant even after heavy infestations. Chemical control with Cebetox and Wofatox etc. should be confined to nurseries etc. [Cf. *F.A.* 17 No. 4151.]

681. **[Biological control of a scale on Black Wattle.]** *Rep. For. Dep. Tanganyika 1956*, 1957 (15).

An outbreak of *Icerya purchasi* on Black Wattle was effectively controlled by the release in the area of a species of ladybird, *Rodolia cardinalis*.

682. DUDA, E. J. ***Fiorinia externa* n. sp.—a scale on Hemlock.** *Sci. Tree Topics* 2 (4), 1957 (9–10). 1 ref.

This scale insect is becoming a more serious pest of *Tsuga canadensis* in the eastern U.S.A. than the common Hemlock scale, *Aspidiotus ithaceae*. It may be controlled by the application of malathion.

683. BRAY, D. F. ***Matsucoccus*.** *Sci. Tree Topics* 2 (4), 1957 (10–3).

Gives a general account of the genus and lists known species with their hosts and distribution.

Lepidoptera

See also Nos. 60–2, 253, 589, 660–2, 664–7, 675.

684. GRADWELL, G. R. **Hosts of three species of *Eulophus* Geoffroy (Hym. Chalcidoidea), one new to science and another new to Britain.** *Ent. mon. Mag.* 93 (1117), 1957 (140–2). 1 ref.

Describes *E. nigribasis* sp. nov., parasitic on larvae of *Apatele leporina*, *Orthosia cruda*, *O. stabilis*, *Lophopteryx capucina*, *Diataraxia oleracea*, *Colocasia coryli*. *Eulophus larvarum* is recorded from larvae of *Cosmia trapezina*, *Operophthera brumata*, and *Orgyia antiqua*. *Eulophus opacula*, hitherto unknown in Britain, is recorded as a larval parasite of *Griposia aprilina* and *Mamestra* sp.

685. SILVER, G. T. **Studies on the Arborvitae leaf miners in New Brunswick (Lepidoptera; Yponomeutidae and Gelechiidae).** *Repr.* from *Canad. Ent.* 89 (4), 1957 (171–82). 8 refs.

Notes on the life history of *Argyresthia thuiella*, *A. freyella*, *A. aureoargentella* and *Recurvaria thujaella*, with particular reference to feeding habits, the effects of infestations on the stands, and natural control.

686. SAMUELSON, G. A. **Observations on *Recurvaria milleri*, the Lodgepole needleminer.** *Lepidopterists' News, New Haven, Conn.* 8 (3/4), 1954 (91–3). O.H.

Describes a severe outbreak in the Yosemite National Park, chiefly at 7000–10,000 ft. alt. on Lodgepole Pine, the dominant species. Generally mortality was due to beetle attack on the weakened trees, but 4 trees were found which had been killed by the needle-miner, whose life cycle, habits, and parasites are discussed.

687. SCHWERDTFEGER, F., and SCHNEIDER, G. Über den Einfluss von Lärchenminiermotten-Frass auf Benadelung und Zuwachs der Lärche. **[Defoliation of Larch by *Coleophora laricella* and its effect on increment.]** *Forstarchiv* 28 (6), 1957 (113–7). [G.g.]

A 20- to 25-year Spruce/Larch stand, infested with *C. laricella*, was treated in Sept. 1954 with 50 kg./ha. of E 605 powder. Half the stand was left untreated. Examination of 4 Larch trees in each half showed that the foliage on the untreated trees was reduced by $> 40\%$ compared with the treated trees. The corresponding reductions in diameter increment for 1954–56 averaged 33–45%.

688. **European Pine shoot moth [*Rhyacionia buoliana*].** *Rep. Sci. Serv. Dep. Agric. Can. 1955/56*, 1957 (12).

Surveys in 1955 showed that populations of this insect were still relatively low in Quebec and that the northern limit of its occurrence in Ontario was unchanged, the limiting factor probably being low temperatures. Tests of undercooling point were made on overwintering larvae collected from 4 different temperature zones within the infested area in S. Ontario and two in Michigan, in an attempt to determine whether or not the more northerly populations were more resistant to cold than those in the south. No significant difference was found, but larvae are capable of hardening to low temperatures, and when exposed to temperatures between + 7·5 and − 7·0° F. for one week, they undercooled to a significantly lower level than larvae held at higher temperatures. Snow cover has a strong effect in moderating the temperatures to which overwintering larvae are exposed in the field, and exposure to warmer conditions in the spring and the ingestion of food significantly raise the undercooling point of larvae.

689. **Growth loss caused by tip moth reduced with insecticidal sprays.** *Rep. Sth. For. Exp. Sta. 1956*, 1957 (66).

Loblolly Pines sprayed with a water emulsion

containing 5% DDT, 0·5% γ BHC or 0·5% malathion in mid-February, during or just before the spring emergence of *Rhyacionia frustrana*, were respectively 2·5, 1·9, and 2·1 ft. taller 10 months after treatment, than untreated controls. The residual action of DDT lasted ca. 1 month longer than that of the other sprays.

690. MILLER, C. A. **A technique for estimating the fecundity of natural populations of the Spruce budworm.** *Repr.* from *Canad. J. Zool.* 35 (1), 1957 (1–13). 10 refs.

In a severe infestation, late-instar larvae that normally feed on current foliage may be forced to complete development on old foliage, with a consequent reduction in fecundity. The relationship of pupal-case size to fecundity is used as a basis for estimating expected fecundity in a natural population under these conditions of partial larval starvation. Three regression equations applicable to the conditions of Green River, New Brunswick, are presented. [Cf. *F.A.* 17 No. 1768.] *From author's summary.*

691. GREENBANK, D. O. **The role of climate and dispersal in the initiation of outbreaks of the Spruce budworm in New Brunswick. II. The role of dispersal.** *Repr.* from *Canad. J. Zool.* 35, 1957 (385–403). 18 refs.

[Cf. *F.A.* 18 No. 1872.] From recent data on the dispersal of the Spruce budworm it is shown that larval and adult populations are dispersed more or less continually, particularly in the direction of the prevailing wind. Large segments of an adult population may be transported over long distances by air currents, and unspent females often predominate in their movements. When deposited in dense mature conifer stands the moths can create outbreaks, but in young, open or mixed stands the ensuing high populations will decline unless there are repeated invasions.

692. **[Budworm dispersal.]** *Rep. Sci. Serv. Dep. Agric. Can. 1955/56*, 1957 (8).

Work on the population behaviour of the Spruce budworm in different types of forest stand was continued on the Green River Watershed in New Brunswick. Analysis of the data showed that the loss of the insect through dispersal was related to stand factors. The loss of small air-borne larvae, for example, varied from 60% in dense Balsam stands to > 90% in certain mixed stands or in small isolated areas of Balsam.

693. THOMSON, H. M. **The effect of a microsporidian disease on the rate of development of the Spruce budworm.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 13 (3), 1957 (3).

Spruce budworm infected with *Perezia fumiferanae* [cf. *F.A.* 18 Nos. 3093–4] develop at a slower rate during both larval and pupal stages, and have a shorter adult life than non-infected insects. Females are affected more than males.

694. FLIEGER, B. W. **Five years of spraying.** *Pulp Paper Mag. Can.* 58 (7), 1957 (274 . . . 278).

From a general review of the New Brunswick and Gaspé operations, for which data (1952–57) covering acreage, quantity of insecticides, dose/acre, expenditure, airfields, aircraft etc., are given, it is concluded that without spraying (which has not suppressed the outbreak), tree mortality would by now have brought woods operations to a stop for a long time (> 37 years). Costs for 1952–56 are about $8·5 million (10–15 cents/cord of standing timber or $1·0–1·5/cord of pulpwood cut during the period). Spraying has also maintained consistently low fire hazard, and to stop now would be to court disaster by cutting short the life of weakened trees.

695. BLAIS, J. R., and MARTINEAU, R. **Aerial spraying against Spruce budworm in Quebec—1956.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 13 (3), 1957 (2–3).

Report on the 3rd consecutive year of operations, in which 446,000 acres were treated in the Lower St. Lawrence and Gaspé regions. [Cf. *F.A.* 17 No. 4165.]

696. WEBB, F. E. **Aerial spraying against Spruce budworm in New Brunswick—1956.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 13 (3), 1957 (1–2).

A detailed analysis of costs and results for the 5th consecutive large-scale spraying operation. [Cf. *F.A.* 17 Nos. 4166–7.]

697. JAHN, E., and SINREICH, A. Beobachtungen zum Auftreten des Schwammspinners (*Lymantria dispar* L.), des Goldafters (*Euproctis chrysorrhoea* L.) und des grünen Eichenwicklers (*Tortrix viridana* L.) in Niederösterreich und im Burgenland in den Jahren 1952 bis 1956. **[The outbreaks of *L. dispar*, *E. chrysorrhoea* and *T. viridana* in Lower Austria and Burgenland in the years 1952–1956.]** *Anz. Schädlingsk.* 30 (9), 1957 (139–46). 4 refs. [G.]

Notes on the history of the outbreaks, diseases and parasites, estimates of population densities, and control measures, with a comparison of the present and past history of outbreaks.

698. FOSTER, A. A., and HARRISON, R. P. **Seedling losses in Arizona Cypress.** *Tree Plant. Notes* No. 29, 1957 (20–1).

Seedlings of *Cupressus arizonica* were found to be girdled below ground by larvae of the corn stalk borer [*Diatraea zeacolella*]. A survey of cover crops in the nursery showed that field peas were heavily infested with the insect.

699. BALDASSERONI, V. Dei gravissimi danni arrecati alle pine di *Pinus pinea* da farfalle del gen. *Dioryctria* Zell. **[Severe damage to cones of *P. pinea* by *Dioryctria* spp.]** *Ital. for. mont.* 12 (1), 1957 (59–60). [It.]

An account of damage to cones by *D. mendacella* and *D. pineae*. Infested cones may be distinguished by their resinous exudation. Spraying with a 1% aqueous solution of Gesarol (50% active principle) gave good control.

700. OSSOWSKI, L. L. J. **The biological control of the Wattle bagworm (*Kotochala junodi* Heyl.) by a virus disease. I. Small-scale pilot experiments.** *Ann. appl. Biol.* 45 (1), 1957 (81–9). 16 refs.

Aqueous suspensions of a virus infecting *Acanthopsyche junodi* larvae were prepared. Applied to the leaves of *Acacia decurrens* var. *mollissima* at the time when the larvae were hatching, in concentrations of 10,000 polyhedra/cu. mm. the virus caused very heavy mortality within 6–14 days after feeding began. Older larvae lived somewhat longer. Higher concentrations were not more effective. In spite of heavy rainfall, larvae placed on trees 2 months after spraying became heavily infected, suggesting possibilities of pre-emergence spraying. The virus did not infect other insects, e.g. parasites.

701. DUNCAN, D. P. *et al.* **Influence of the forest tent caterpillar (*Malacosoma disstria* Hbn.) upon the Aspen forests of Minnesota.** Office of Iron Range Resources and Rehabilitation, St. Paul, Minn. 1956. pp. 45. 10 refs.

Serious epidemics take place about once in 10 years. The effect of defoliation upon Aspen [*Populus tremuloides*] increment is likely to be a reduction of ca. 70% in the first year of a heavy defoliation, ca. 90% during the second, and ca. 15% during the year of recovery. The favourable effect of Aspen and Hazel defoliation on the coniferous regeneration in the understorey is slight and temporary, since defoliation does not kill them.

702. WELLINGTON, W. G. **Individual differences as a factor in population dynamics: the development of a problem.** *Repr.* from *Canad. J. Zool.* 35, 1957 (293–323 + 9 plates). 16 refs.

Field and laboratory studies were made on the individual behaviour of larvae of *Malacosoma pluviale*, a pest of Alder and Willow. Distinctions were established between different types of larvae and it is suggested that the % of different types in a colony varies between infestations and also from year to year. Further study is needed.

703. DREES, H., and SCHWITULLA, H. Bekämpfung einer Epidemie von *Malacosoma neustria* L. durch die Tachine *Carcelia gnava* Meig. **[Control of an outbreak of *M. neustria* by the tachinid *C. gnava*.]** *Z. PflKrankh.* 64 (4), 1957 (215–28). 19 refs. [G.g.e.] E.M.B.

Three years after the establishment of *C. gnava* in an experimental area, a mass infestation by *M. neustria* had broken down.

704. REMINGTON, C. L., and PEASE, R. W. **Studies in food plant specificity. I. The suitability of Swamp White Cedar (*Chamaecyparis thyoides*) for *Mitoma gryneus* (Lycaenidae).** *Lepidopterists' News, New Haven, Conn.* 9 (1), 1955 (4–6). O.H.

Offspring of a ♀ *M. gryneus* collected on its specific food plant *Juniperus virginiana* in Connecticut, were placed on branches of *Chamaecyparis thyoides*, the food plant of the closely related *M. hesseli*. Six of 8 larvae developed into imagos, and a second generation of larvae was also obtained, showing that there was no nutritional sterility.

705. BEVAN, D., and PARAMONOV, A. **Fecundity of *Bupalus piniarius* in Britain, 1955.** *Rep. For. Res. For. Comm., Lond. 1955/56*, 1957 (155–62). 7 refs.

An investigation was made to determine the correlation, if any, between the weight of ♀ pupae of *B. piniarius* and the number of eggs laid by the adult moth. A straight-line regression was obtained for the 'probable fecundity'/pupal-weight relationship, 'probable fecundity' being defined as the number of eggs laid plus the number of eggs found in the oviduct at death. The regression was $n = 14{\cdot}6\,w - 63$, where n is the 'probable fecundity' and w is the pupal weight in $\frac{1}{100}$ g. Such a relationship make it possible to estimate the fecundity of a generation merely by weighing a sample of the pupae.

706. THOMSON, M. G. **Appraisal of Hemlock looper [*Ellopia* (*Lambdina*) *fiscellaria*] infestations.** *For. Chron.* 33 (2), 1957 (141–7). 3 refs.

Points out the need for early protection of timber from looper infestations, and indicates what information is necessary to appraise an outbreak of this insect when it is first discovered.

707. SCHINDLER, U. **The 1956 campaign against the owl moth *Panolis flammea* (Schiff.) in the southeast of Luneburg Heath.** Lister Todd Engineering Corporation Ltd., London. [1957]. pp. 9. 7 refs.

An outbreak on an area of 3000 ha. with a pupal density well above the critical level, was successfully controlled, in spite of unsuitable weather, by treatment in June with DDT applied by light-weight TIFA fogging machines [see *F.A.* 15 No. 486]. Parasites, mostly appearing towards the end of June, were comparatively little affected. There was no reduction in numbers of nesting birds in breeding cages attributable to the DDT.

708. ŞTEFANESCU, M. Combaterea omizilor defoliatoare prin procedeul ceții in pădurea Ciolpani. **[Control of defoliating larvae by aerosols in Ciolpani Forest.]** *Rev. Pădurilor* 1957 (3), (162–4). 1 ref. [Rum.]

Successful control of *Lymantria dispar* was obtained by Combi-Aerosol F (a mixture of DDT and BHC) applied by an S-811 generator on a KD-35 tractor, at ca. 20% of the cost of aerial spraying.

709. ARSENESCU, M. *et al.* Combaterea aviochimică a omizilor de *Lymantria dispar* în pădurile din zona verde a orașului București, executată în primăvara 1956. **[Control of *L. dispar* by aerial spraying in the forests of the green belt round Bucharest in the spring of 1956.]** *Rev. Pădurilor* 1957 (4), (244–50). [Rum.russ.g.]

The usual treatment is with Gesaktiv (5% DDT + 0·4% γ-isomer of BHC) at a dosage of 50 kg./ha. Successful trials were also made with 5% DDT powder and 0·5–1% emulsion. BHC (1·5% γ-isomer) used alone was much less effective.

710. VEBER, J. **A cytoplasmic polyhedral disease of the gypsy moth (*Lymantria dispar* L.).** *Nature, Lond.* 179 (4573), 1957 (1304–5). 2 refs.

During investigation of an outbreak of *Lymantria dispar* in Slovakia in 1954 and 1955, many larvae were found to be naturally infected with a cytoplasmic virus. In cross-inoculation studies it has been established that the polyhedra are infectious and cause similar diseases in other lepidopterous larvae.

711. VIOTTO, F. Lotta contro la *Taumatopea pityocampa* (processionaria del pino) mediante insetticida a base di parathion. [**Control of *Thaumetopoea pityocampa* (Pine processionary moth) by parathion.**] *Monti e Boschi* 8 (6), 1957 (265–70). [It.]

Describes the successful use of parathion-based sprays (Fosdit, Tetrafos, Escatox), applied to the nests by back-pack pumps.

712. NIZI, G. La processionaria del pino e i mezzi per combatterla. [***Thaumetopoea pityocampa* and methods of control.**] *Monti e Boschi* 8 (6), 1957 (271–4). [It.f.e.]

Good results are being obtained by dusting the tree trunks and ground beneath the trees with DDT, BHC, chlordane or heptachlor when the larvae are about to leave the nests in order to pupate in the soil.

713. ANDROIĆ, M. Contribution à l'étude de *Cnethocampa pityocampa* Schiff. [**Notes on *Thaumetopoea pityocampa*.**] *Rev. Path. vég.* 35 (4), 1956 (251–62). 34 refs. [F.] I.M.I.

Covers chiefly the ecology and phenology of this processionary moth in Jugoslavia with notes on anatomy, and general distribution. Three new parasites are noted (2 bombylids and one pteromalid).

Coleoptera

See also Nos. 63–6, 602, 667, 1082, 1098.

714. BARTER, G. W. **Studies of the bronze Birch borer, *Agrilus anxius* Gory, in New Brunswick.** *Repr.* from *Canad. Ent.* 89 (1), 1957 (12–36). 33 refs.

Notes on morphology and life history, with observations on larval habits, relationship to the host, nature of injury, and natural and artificial control. Since the larvae can survive only in weakened trees, the best control measures are those that maintain the health of the stand. Laboratory experiments showed that exposure for ½-hour to surfaces sprayed with DDT at 1–2 lb./100 gal. will kill adults. In field experiments it was found that trees can be protected from attack by two thorough applications of DDT in suspension or emulsion at 10 lb./100 gal.

715. FINN, R. F., and LIMSTROM, G. A. **Black Locust sprouts also susceptible to borer attacks.** *Sta. Note Cent. St. For. Exp. Sta.* No. 101, 1957. pp. 2.

Clear felling and felling every alternate tree were tried in 3- and 13-year plantations of *Robinia pseudoacacia* infested by *Megacyllene* (*Cyllene*) *robiniae*. After 4 years, damage to the coppice shoots was as severe as in the original stems. The number and survival of stems was higher on the clear-felled sites. Rate of height growth on both sites was higher than for the original stems.

716. GARDNER, J. C. M., and EVANS, J. O. **Notes on *Oemida gahani* Distant (Cerambycidae). Part II.** *E. Afr. agric. J.* 22 (4), 1957 (224–30). 1 ref.

[Cf. *F.A.* 14 No. 3553.] Additional notes cover characters distinguishing this species (adult and larva) from *Androeme plagiata* (possibly of economic importance), host species, biology, damage in plantations, protective measures, association with monkey and pruning damage, disposal of affected timber, and attack on structural timber.

717. JOHNSON, W. T. **On the biology and control of the North American Chestnut weevils.** *Abstr. of thesis*, in *Dissert. Abstr.* 17 (1), 1957 (189–90). O.R.S.

Preliminary tests with heptachlor, 6–8 lb./acre, applied as a spray or dust to ground cover under the trees, have given good control of *Curculio auriger* and *C. proboscideus*, which have survived, in spite of Chestnut blight, on resistant species and individuals and on coppice growth. Results of field rearing tests are described.

718. CAMPBELL, S. **Note on Pine weevil [*Hylobius abietis*] control.** *Irish For.* 15 (1), 1957 (50–3).

The usual method of controlling weevils in plantations established on recently felled Pine sites is by placing freshly peeled Pine bark in shallow pits throughout the area and destroying the trapped insects daily. In 1955 experiments were made on the Pakenham Hall Estate in the use of DDT to control weevils: (*a*) by dipping planting stock, to a depth of 1 in. below the collar, in a 25% solution of DDT in oil, made up to a dip containing 5% of the active ingredient (1 part concentrate to 4 parts water); (*b*) using the same mixture to spray young trees in infested plantations; and (*c*) dusting the traps with DDT so as to avoid the expense of daily visiting. Both (*a*) and (*b*) gave good control at a cost of 13*s.* 6*d.* and 17*s.*/acre respectively, and (*c*) looks promising.

719. CROOKE, M. **Experiments on the control of the Pine weevil *Hylobius abietis* L.** Forestry Commission, London. 1957. pp. 37. 9 refs. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

Summarizes the results of a series of experiments on the protection of newly formed conifer plantations against *Hylobius abietis* attack, using DDT, BHC and dieldrin at various dosages, applied either as dips before planting or as sprays or dusts after planting. Almost all treatments gave adequate levels of practical protection, and the choice of standard method depends almost entirely on convenience and cost. In general, dipping is to be preferred, and the most suitable material is considered to be 5% DDT. Spraying or dusting are useful where weevil attack develops unexpectedly, but are considerably more expensive than dipping. Spraying is probably more convenient than dusting, although the latter gives slightly better results, and a spray of 1% DDT at the rate of 50 c.c. per plant is recommended. Re-treatment in the second season improves the protection afforded but not enough to make double treatment economic. *From author's summary.*

720. GODWIN, P. A., JAYNES, H. A., and DAVIS, J. M. **The dispersion of radioactively tagged White Pine weevils in small plantations.** *J. econ. Ent.* 50 (3), 1957 (264–6). 8 refs.

The host trees of labelled beetles (16,000 released in the centre of a plantation on 2nd Sept.) are

shown on maps for the following 13 Oct., 28 April, and 13 May, in order to clarify contradictory statements on flights and to determine the width of surround for the isolation of sprayed plots. Uninterrupted flights of 300–400 ft. are indicated. Movements of 724 ft. are a certainty and if flights of this distance occur with 1% frequency, invasion from a natural population of 2000–3000/acre would be important. Surrounds should be at least 800 ft. wide. Evidence for the value of hardwoods as a mechanical barrier is increasing.

721. JAYNES, H. A., and GODWIN, P. A. **Sterilization of the White Pine weevil [*Pissodes strobi*] with gamma radiation.** *J. econ. Ent.* 50 (4), 1957 (393–5). 4 refs.

As a preliminary to a dispersal study, weevils dosed with 5, 10, or 20 thousand roentgen (*r*) from Co^{60} were subjected to eight mating combinations of treated and untreated, mated and unmated, males and females. The effects on longevity, feeding, fecundity, and egg fertility are tabulated. For sterilizing weevils, $r = 5$–10 thousand appears best. Longevity is not reduced and egg-sterility is satisfactory. Diminished feeding and oviposition rates suggest, however, possible alteration in flight habits.

722. **White Pine weevil [*Pissodes strobi*].** *Rep. Sci. Serv. Dep. Agric. Can. 1955/56*, 1957 (12).

Investigations on *P. strobi* included studies of the effects of weather on the behaviour and activity of adults and larvae. In the field, adults were labelled with radioactive Co as a means of following their movements. It was found that, in exposed stands, climatic factors, and particularly temperature, markedly influenced weevil behaviour and development. This may explain the observed freedom from weevil attack of White Pines growing in certain shaded conditions.

723. TOMIĆ, D. Potkornjaci šumskog rezervata planine Golije u 1953 godini. **[Barkbeetles in the forest reserve on Mt. Golija in 1953.]** *Šumarstvo* 10 (3/4), 1957 (207–10). 3 refs. [Serb.e.f.]

Studies were made in June 1953 on Fir (*Abies alba*), Beech (*Fagus sylvatica*) and Spruce (*Picea abies*) that had been wind-thrown and wind-broken in a storm the previous year; d.b.h. averaged 100 cm. for Fir and Beech, 50 cm. for Spruce. Spruce was most heavily attacked, particularly by *Ips typographus* and *Pityogenes chalcographus*; other species also found were *Polygraphus polygraphus*, *Hylurgops palliatus*, *Dryocoetes autographus* and *Hylastes cunicularius*. Fir was attacked by *Cryphalus piceae* and *Ips vorontzowi*, and Beech by *Taphrorhychus bicolor* and *Xyloterus domesticus*.

724. RUCKES, H., JR. **The overwintering habitat of the Sugar-Pine cone beetle.** *J. econ. Ent.* 50 (3), 1957 (367–8). 3 refs.

Indicates that casual twig-mining [cf. *F.A.* 8 No. 2765] is the normal overwintering habit of *Conophthorus lambertianae*. Details of twig appearance and mode of entry etc. are given. [Cf. *F.A.* 18 No. 1913.]

725. MASSEY, C. L. **Four new species of *Aphelenchulus* (Nematoda) parasitic in bark beetles in the United States.** *Repr.* from *Proceedings of the Helminthological Society of Washington* 24 (1), 1957 (29–34). 7 refs.

Describes in detail: *A. barberus* (type hosts *Dendroctonus barberi* and *D. frontalis*); *A. brevicomi* (*D. brevicomis*); *A. spirus* (*Ips oregoni*); and *A. grandicolli* (*Ips grandicollis*).

726. **Mountain Pine beetle [*Dendroctonus monticolae*].** *Rep. Sci. Serv. Dep. Agric. Can. 1955/56*, 1957 (13).

In laboratory experiments, 2 generations were raised in 1955 when predators and parasites were excluded, but when they were not excluded, high mortality prevented the production of 2 generations of adults. Under natural conditions, 24% of the beetles were infested by nematodes, and statistical analysis demonstrated that infested ♀s laid significantly fewer eggs than uninfested ♀s.

727. VITÉ, J. P., and RUDINSKY, J. A. **Contribution toward a study of Douglas Fir beetle development.** *For. Sci.* 3 (2), 1957 (156–67). 5 refs.

The phases, characteristics and duration of the developmental stages of *Dendroctonus pseudotsugae* studied in the laboratory at 21·5° C., and their duration at various constant temperatures, are described with drawings. Development under field conditions is briefly compared. There are 4 larval instars. Ovaries mature in the pupal and tender adult stages. The uneven sex ratio in attacked trees does not seem to affect the reproductive potential.

728. GIBSON, A. L. **Tests of bark-penetrating insecticides to control the Douglas Fir beetle.** *J. econ. Ent.* 50 (3), 1957 (266–8). 3 refs.

Sprays composed variously of lethal, emulsifying, and spreading agents and diesel oil or water were tested over a 3-year period on infested trees and logs, wet and dry. Orthodichlorobenzene, trichlorobenzene, dichloroethyl ether in oil and ethylene dibromide in either oil or emulsion gave equally good control. Water-saturated and green bark prevented complete control with some formulae. The use of ethylene-dibromide emulsion with local water saves 75% of the transport cost required for oil-base sprays. *From author's summary.*

729. SMITH, R. H., and LEE, R. E. **Black turpentine beetle [*Dendroctonus terebrans*].** *For. Pest Leafl. U.S. Dep. Agric.* No. 12, 1957. pp. 7. 2 refs.

730. SMITH, R. H. **Habits of attack of the black turpentine beetle on Slash and Longleaf Pine in North Florida.** *J. econ. Ent.* 50 (3), 1957 (241–4).

Dendroctonus terebrans has some peculiarities possibly useful in its control. The investigation described showed that an average of 5 attacks per tree were made in the first month after attacks started, and these were confined to the basal 18 in. of the bole. Subsequent attacks, spread over 5–7 months with a peak in the 2nd and 3rd month, increase in number and in height up the bole, and

eventually average 28 per tree, 85% of which are in the basal 36 in. and only 3% above 72 in. The number of attacks increases with d.b.h., but the height distribution of attack is unaffected by diameter in the range 9 to 17 in. d.b.h. The habits of the beetle were the same on both hosts, and for tapped and untapped trees.

731. CROOKE, M., and BEVAN, D. **The Larch bark beetle, *Ips cembrae* Heer.** *Rep. For. Res. For. Comm., Lond. 1955/56*, 1957 (70–1).

This insect was found for the first time in Britain in 29 localities in N.E. Scotland. It is thought to have entered the country in post-war consignments of German timber. Shoot-tunnelling by adults is an obvious feature of the attacks. European, Japanese and hybrid Larches have all been attacked, in crops varying in age from 8 to 200 years.

732. ZINECKER, E. Der grosse Fichtenborkenkäfer (*Ips typographus* L.) in seiner Abhängigkeit vom Standort. [***I. typographus* in relation to site conditions.**] *Anz. Schädlingsk.* 30 (7), 1957 (99–104). 24 refs. [G.]

A survey based on literature.

733. **Pine shoot beetles [*Myelophilus piniperda* and *M. minor*].** *Leafl. For. Comm., Lond.* No. 3 (rev.) 1957. pp. 9. Price 8*d*.

734. GOTTSCHALK, C. Untersuchungen über die Wirkung verschiedener Substanzen als Lock- oder Frassstoff auf einige Insektenarten. [**The role of various substances as attractants or food for some insect species.**] *Beitr. Ent.* 7 (1/2), 1957 (177–9). 7 refs. [G.g.e.russ.] O.H.

Includes some work with *Melolontha melolontha*, which fed on a number of plants (including herbaceous species). Wetting the leaves with tannin or sucrose solutions usually caused intensified feeding.

Hymenoptera

See also Nos. 659, 668.

735. DAVIAULT, L. **The Red Pine web-spinning sawfly, *Cephaleia marginata* Middekauf (Hymenoptera, Pamphiliidae).** *Repr.* from *Canad. Ent.* 88 (8), 1956 (488–92). 2 refs.

A description of the sawfly and it habits. First noticed in the summer of 1939 in a young Red Pine plantation near Berthierville, Quebec, it has since been found in a few other plantations in the same neighbourhood, but is nowhere abundant enough to cause serious damage.

736. RAIZENNE, H. **Forest sawflies of Southern Ontario and their parasites.** *Publ. Dep. Agric. Can.* No. 1009, 1957. pp. 45 + tbl.

For each sawfly species, lists years in which recorded, food plants, distribution, seasonal history, numbers of collections received, and parasites, with similar data for parasites.

737. FORSSLUND, K.-H. Lilla tallstekeln: en svår skadegörare. [***Diprion pallipes*: a serious pest.**] *Skogen* 44 (14/15), 1957 (474). [Sw.]

Describes the extent and nature of the damage and recent outbreaks on Scots Pine in Sweden.

738. MACALONEY, H. J. **The red-headed Pine sawfly [*Neodiprion lecontei*].** *For. Pest Leafl. U.S. For. Serv.* No. 14, 1957. pp. 4. 2 refs.

739. SCHWERDTFEGER, F. Die kleine Fichtenblattwespe in Niedersachsen. [***Pristiphora abietina* in Lower Saxony.**] *Aus dem Walde, Hannover* No. 1, 1957 (75–87). [G.]

Tabulates and analyses the frequency and severity of outbreaks in 8 districts (chiefly in stands aged 40–60 years) during the period 1946–55, and describes control experiments. Soil poisoning in spring with DDT and/or BHC was ineffective, killing only 20–50% of the emerging sawflies. Dusting the trees from the ground with 50 kg./ha. BHC or DDT dusts [content of active agent not stated] killed 90 to > 95% of the larvae, and spraying by helicopter with 35 kg./ha. of a DDT/benzol/diesel-oil preparation (0·9 kg./ha. pure DDT) killed 70–80%; mist-blowing from the ground was not sufficiently effective. Where colonies of *Formica rufa* were introduced when the outbreak had passed its peak, a count of pupae showed a reduction of 27–30%, but it is felt that no conclusions can be drawn as to their potential effect in an epidemic or even in preventing one.

740. OHNESORGE, B. Zur Prognose des Schadauftretens der kleinen Fichtenblattwespe. [**Forecasting outbreaks of *Pristiphora abietina*.**] *Anz. Schädlingsk.* 30 (8), 1957 (116–21). 12 refs. [G.]

Presents the results of experiences gained during investigations made by the Niedersächsische Forstliche Versuchsanstalt. *Short-term forecasting*: Notes are given on pupal counts, costs of such sampling, the assessment of the state of health and the mortality of populations and the 'critical' number of pupae. *Long-term forecasting*: The studies were based on the numerical relationship of full to empty cocoons, degree of parasitization and the average length of ♀ cocoons, which has a tendency to decrease as the duration of the outbreak increases.

741. SHANAHAN, P.; BENSON, R. B. **The distribution of the bean gall sawfly *Pontania proxima* (Lep.) (Hym. Tenthredinidae) on *Salix fragilis* L.** *Ent. mon. Mag.* 93 (1119), 1957 (182–3). 1 ref.

742. HEDLIN, A. F. **Notes on the life history and habits of a chalcid, *Bruchophagus caraganae* (Nik.), (Hymenoptera: Chalcididae), infesting seeds of *Caragana*.** *Repr.* from *Canad. Ent.* 88 (11), 1956 (622–5). 5 refs.

Diptera

743. DISSESCU, G. Atac de *Agromyza carbonaria* Zett. pe *Populus marilandica*. [**Attack by *A. carbonaria* on *P.* x *marilandica*.**] *Rev. Pădurilor* 1956 (1), (59–60). 2 refs. [Rum.]

In thinning a 10-year-old sample plot of *P.* × *marilandica*, it was discovered that 10% of the trees removed were infested with *A. carbonaria*. The larval galleries, illustrated and described, were infected with bacteria producing a brown stain.

459. Other Animals

See also No. 1258.

744. IMMEL, R. Schadauftreten von Nematoden in Forstpflanzgärten. **[Damage by nematodes in forest nurseries.]** *Anz. Schädlingsk.* 30 (6), 1957 (88–90). 2 refs. [G.]

Describes the nature of injuries inflicted on Pine, Douglas Fir and Spruce seedlings.

745. CHITWOOD, B. G., and ESSER, R. P. **Pathogenicity tests involving *Meloidodera floridensis*, a nematode associated with Slash Pine.** *Plant Dis. Reptr.* 41 (7), 1957 (603–4). A.P.B.

M. floridensis reproduced and increased on *Pinus elliottii* seedlings without apparent injury to the roots or tops. *From authors' summary.*

746. SNETSINGER, R., and HIMELICK, E. B. **Observations on witches' broom of Hackberry.** *Plant Dis. Reptr.* 41 (6), 1957 (541–4). 4 refs. A.P.B.

Notes on an eriophyid mite (a new species of *Aceria*) and a fungus (*Sphaerotheca phytoptophila*) associated with witches' broom of *Celtis occidentalis.*

48. Injuries Due to Unknown or Complex Causes

747. KRAUSS, H. Weisstannen-Vorkommen und Weisstannen-Sterben in Thüringen. **[The distribution of Silver Fir in Thuringia and its decline through disease.]** *Forst u. Jagd* 7 (3; 4), 1957 (102–9; 151–3). 40 refs. [G.g.]

Stresses in particular the role of man and cattle in destroying the conditions under which Silver Fir flourished naturally in the region, with special reference to the rooting behaviour of Spruce and Silver Fir in competition for scarce water,and makes recommendations for silvicultural measures favouring Silver Fir, including its planting with Mountain Ash as nurse.

748. PÉTER-CONTESSE, J. À propos du dépérissement du sapin sur la première chaîne du Jura. **[The dying out of Silver Fir on the first chain of the Jura.]** *Schweiz. Z. Forstw.* 108 (6), 1957 (343–8). [F.g.]

Discusses the reasons for, and the symptoms (root rot, mistletoe, barkbeetle, frost and drought damage) of, low vigour in Silver Fir stands on the first chain of the Swiss Jura, where it has been grown either outside its natural habitat, or in 'pseudo-natural' pure stands on sites where it occurs naturally in mixture with light-demanding hardwoods. [Cf. *F.A.* 11 Nos. 2292–3.]

749. MURRAY, J. S. **Top dying of Norway Spruce in Great Britain.** Forestry Commission, London. 1957. pp. 9. 4 refs. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand 1957.)

Observations on 'top dying' of *Picea abies* are described. The hypothesis that the disease is caused by either direct or physiological drought closely followed by the needle fungus *Rhizosphaera kalkhoffii* is put forward. [Cf. *F.A.* 15 Nos. 3855–6.] *From author's summary.*

750. GRANITI, A. Risultati di inoculazioni artificiali con ceppi di *Cytospora corylicola* Sacc., isolati da noccioli colpiti da *mal dello stacco* in Sicilia. **[The results of artificial inoculation with cultures of *C. corylicola* isolated from Hazels suffering from *mal dello stacco* in Sicily.]** *Ital. for. mont.* 12 (2), 1957 (93–8 + 2 plates). 14 refs. [It.it.f.]

Inoculations, made in various ways, with the fungus commonly associated with this form of die-back in *Corylus avellana* and often supposed to be the pathogen, gave uniformly negative results, and it is concluded that *C. corylicola* is a secondary parasite on plants already weakened by edaphic or climatic factors or mismanagement. [Cf. *F.A.* 13 No. 3111.]

751. TOOLE, E. R. **Status of Sweetgum [*Liquidambar styraciflua*] blight, 1956.** *Abstr.* in *Phytopathology* 47 (5), 1957 (314).

This disease is increasing in the Mississippi Delta. No pathogen has yet been isolated, and injection of minor elements has had no effect. [Cf. *F.A.* 16 Nos.741, 4361–3; 17 Nos. 1827, 3089; 18 No. 4374.]

752. **[Sweetgum blight.]** *Rep. Sth. For. Exp. Sta. 1956*, 1957 (56–7).

Studies of 76 Sweetgum stands in Mississippi and Louisiana showed that blight was correlated with broad soil provinces. The soil in a severely blighted stand had characteristics limiting available water. At depths of 3 to 6 ft., total soluble salts were considerably higher than in a slightly affected stand.

5. FOREST MENSURATION. INCREMENT; DEVELOPMENT AND STRUCTURE OF STANDS. SURVEYING AND MAPPING

52. Measurements of Stem Dimensions and Volume of Trees, Stands, Forests and Timber

521. Diameter (Girth) and Sectional Area

See also Nos. 757–8, 777–8, 835.

753. PRODAN, M. Hilfsmittel zur raschen Durchmesserermittlung stehender Bäume. **[Aids for rapid measurement of the diameter of standing trees.]** *Forstarchiv* 28 (7), 1957 (155–6). 4 refs. [G.]

Briefly reviews the principles and the use of a German-made Biltmore stick: Thoma's 'volume estimator' similar in principle to the Biltmore stick, giving direct volume readings based on a standard height of 25 m. (with correction factors for other heights), and provided with 3 notches for use in estimating height; and Bitterlich's *Tarifmesswinkel* [see *F.A.* 18 No. 4385].

754. ARMĂŞESCU, S. Determinarea diametrului mediu în arboretele echiene de Quercinee pe baza

corelației dintre diametrul mediu și cel maxim. **[The determination of mean diameter in even-aged stands of *Quercus* spp. by making use of the correlation between mean and maximum diameters.]** *Rev. Pădurilor* 1956 (10), (662–6). [Rum.]

Gives for *Quercus robur*, *Q. sessiliflora*, *Q. cerris*, and *Q. frainetto*, tabulated values for the ratio of mean to maximum diam. for different ages and 5 quality classes.

755. HAMPF, F. E. **Relationship of stump diameter to d.b.h. for Pitch Pine in the Northeast.** *For. Res. Note Ntheast. For. Exp. Sta.* No. 65, 1957. pp. 3. 2 refs.

A graph is presented for the equation: d.b.h. = 0·963 (stump diam. u.b.) + 0·806 (stump height) − 0·339, obtained from 859 stump-diameter measurements.

756. HAMPF, F. E. **Relationship of stump diameter to d.b.h. for White Oak in the Northeast.** *For. Res. Note Ntheast. For. Exp. Sta.* No. 66, 1957. pp. 3. 2 refs.

From 1266 measurements, the equation: d.b.h. = 0·953 (stump diam.u.b.) + 1·692 (stump height) − 3·645 is developed and presented as a graph.

522. Height, Length

757. BITTERLICH, W. Was ist die 'Hirata-Höhe'? **[What is the 'Hirata height'?]** Harmonische Mittel in Winkelzählproben. **[Harmonic means in angle-count sampling.]** *Allg. Forstztg.* 67 (21/22), 1956 (284–5); 68 (13/14), 1957 (195–6). 6 + 14 refs. [G.]

The first article gives a new derivation of Hirata's formula for mean height [cf. *F.A.* 18 No. 4383]; the second discusses harmonic means in the context of b.a. and mean height, and corrects the formula arrived at in the first article.

758. DISSESCU, R., ARMĂȘESCU, S., and DECEI, I. Contribuții la studiul relațiilor între diametrul și înălțimea arborilor în arboretele de brad. **[Contribution to the study of the relation of diameter to tree height in Silver Fir stands.]** *Bul. ști. Acad. Repub. rom. (Sect. biol.) Ser. agron.* 9 (2), 1957 (143–54). 4 refs. [Rum.russ.f.] O.R.S.

Studies, for 3 even-aged Silver Fir stands, aged 42, 65, and 85 years, the relation of d.b.h. to tree height (variation of height (H) as a function of d.b.h. (D), variation in the ratio H_m/D_m [mean height/mean diameter] as a function of D and as a function of age).

523. Bark

759. ARMAȘESCU, S., and DECEI, I. Contribuții la cunoașterea proporției și volumului de coajă la stejar. **[The percentage and volume of bark in *Quercus robur*.]** *Rev. Pădurilor* 1957 (6), (395–9). 8 refs. [Rum.]

Establishes values based on measurement of 812 trees of 8–70 cm. in diam. and 6–30 m. high, and compares them with data from German and Russian literature.

524. Determination of the Volume of Trees and Stands

524.1. Principles of Volume Determination. Form (Taper)

See also No. 275.

760. ARMAȘESCU, S., and DECEI, I. Indicii de formă q_2 ai arborilor la speciile stejar, gorun și cer. **[Stem form factors q_2 for trees of *Quercus robur*, *Q. sessiliflora* and *Q. cerris*.]** *Rev. Pădurilor* 1956 (9), (594–8). 6 refs. [Rum.russ.g.]

Based on measurements of > 4000 Rumanian trees. The value of q_2 for *Q. robur* and *Q. sessiliflora* was the same (0·682), that for *Q. cerris* smaller (0·631). These figures are compared with similar data from the U.S.S.R.

761. JENSEN, C. E., and WOERHEIDE, J. D. **Pin Oak [*Quercus palustris*] form class.** *Sta. Note Cent. St. For. Exp. Sta.* No. 97, 1956. pp. 2.

Tabulates form class by location and d.b.h., based on measurements of 642 trees, for the S. Illinois-Missouri area.

524.3. Volume of Tree Groups and Stands

See also Nos. 137, 777, 812, 835–6.

762. LEWIS, E. R. **Errors in stand volume estimation for exotic conifers in New Zealand.** *N.Z. For. Res. Notes* No. 9, 1957. pp. 10. 5 refs.

Formulae are provided and discussed for estimating the errors in measuring the stand volume of exotic conifers by the common methods used by the New Zealand Forest Service. The numerical values in the formulae are based on actual data obtained from the chief species. The methods dealt with are the 'volume-line', two-dimensional volume table, form-class volume table, and yield table. Typical values of the limits of error (about the 95% probability level) are shown for the different methods for various numbers of sample trees. It is shown that the two-dimensional volume-table method is only a little less accurate than the much slower 'volume-line' and form-class volume-table methods. *Author's summary.*

763. HARRIS, A. S. **The quick cruise circular slide rule.** *Tech. Note Alaska For. Res. Cent.* No. 37, 1957. pp. 3. 2 refs.

Illustrates the slide rule, devised to give an accurate per-acre volume in bd. ft. Scribner for any $\frac{1}{5}$-acre plot.

764. KEMP, P. D. **Regression coefficients for computing cubic-foot volume of Rocky Mountain trees.** *Res. Pap. Intermt. For. Range Exp. Sta.* No. 40, 1957. pp. 12. 1 ref.

Regression coefficients are presented by species and diam. classes for 13 species, based on the formula $V = bx$, where V = partial volume (i.e. volume u.b. from a 1-ft. stump to a 4-in. top d.u.b.), b = regression coefficient and

$$x = \frac{(\text{d.b.h. in in.})^2 \times (\text{total height in ft.})}{100}$$

765. KEMP, P. D. **A procedure for converting conventional tree volume tables (cubic) to formulae (Part I).** *Res. Pap. Intermt. For. Range Exp. Sta.* No. 43, 1957. pp. 5 + 1 tbl., 1 gph. 2 refs.

[Cf. preceding abstract.] Illustrates the method

of calculating average regression coefficients of total volume, with reference to Western White Pine.

766. YOUNG, H. E. **Merchantable height volume tables for Red and Sugar Maple, White Birch and Poplar.** *Tech. Note Univ. Me. For. Dep.* No. 45, 1957. pp. 4.

Volumes to a 4-in. top diameter u.b.

767. PEDRO VEILLON, J. Tablas de cubicación para árboles en dos tipos de bosques venezolanos. **[Volume tables for trees in two types of Venezuelan forest.]** *Bol. Fac. Cienc. for. Univ. Los Andes* 3 (12), 1956 (25–39 + 3 tbls.). 2 refs. [Span.span.]

Three volume tables for standing trees are presented—one for Andean cloud forest, based on measurement of 175 trees of 30 species, and two (one for trees of normal, the other for those of abnormal taper) for the tropophytic forest of the Western plains, based on measurement of 324 trees of 17 species. Data on taper and form factors are tabulated, and a further table is provided for converting the volume-table figures to probable outturn of sawn timber.

524.6. General Surveys of Forests and Whole Tracts of Forest. Partial Enumeration Surveys, Timber Cruising

See also Nos. 413, 815, 835, 842, 847.

768. RICHTER, A. Zur Durchführung grossräumiger Holzvorratsinventuren. **[Growing stock surveys over large areas.]** *Forst u. Jagd* 7 (2), 1957 (56–8). [G.]

Describes a sample-plot survey in 66 forest districts covering 1,070,000 ha. To achieve the desired accuracy of ± 5% (with a probability of 5%) for growing stock in each district, 700 plots of ca. 0·01 ha. were enumerated, giving a mean sampling intensity of 0·17% at a cost of DM.0·13 per ha. surveyed. Average growing stock (117 cu.m. per ha. forest area) was somewhat higher than previously estimated.

769. HAGBERG, E. Die 3. Schwedische Reichswaldtaxation. **[The third National Forest Survey of Sweden.]** *Arch. Forstw.* 6 (1), 1957 (29–43). [G.]

[Cf. *F.A.* 18 No. 3171.] Includes a copy of the field record sheet.

770. SEELY, H. E. **Forest inventories in Canada.** Forestry Branch, Ottawa. 1957. pp. 11. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

771. **Washington State takes stock of its forests in Operation inventory.** *Timberman* 58 (8), 1957 (77 . . . 84, 90).

Describes the organization, field methods, punched tally cards, office procedure and instruments used in enumerating and mapping State forests now under unified direction. Chief aims are to find the location and area of poor forest for rehabilitation and to arrange the priority of working-plan prescriptions by type and amount of second growth for maximum production.

772. LOETSCH, F. **Report to the Government of Thailand on inventory methods for tropical forests. Part 1—text.** Expanded Technical Assistance Program, FAO, Rome. *FAO Report* No. 545, 1957. pp. 47. Limited distribution.

773. HEINSDIJK, D. **Report to the Government of Brazil on a forest inventory in the Amazon Valley (region between Rio Tapajós and Rio Xingú).** Expanded Technical Assistance Program, FAO, Rome. *FAO Report* No. 601, 1957. pp. 135 + 28 gphs., 2 maps.

In three parts: (1) description of the forest types; (2) tree diameter distribution in tropical forest; (3) the upper storey of tropical forests.

774. ANDERSON, J. A. R. **The enumeration of 235 acres of Dipterocarp forest in Brunei.** *Malay Forester* 20 (3), 1957 (144–50). 4 refs.

Results of an enumeration on compartment 6, Andulau Forest Reserve, are given in tables and a graph showing numbers and % of individuals and volumes by species or timber groups and diameter classes, and size-class representation of the most abundant of the 31 species recorded.

775. SMITH, J. H. G., and KER, J. W. **Some distributions encountered in sampling forest stands.** *For. Sci.* 3 (2), 1957 (137–44). 19 refs.

Discusses, with examples, the need for more complete statistical investigation of the distributions (binomial, negative binomial, Poisson, rectangular) found in sampling, e.g. regeneration and mature stands, and for developing efficient sampling plans from this knowledge.

776. TOMA, G. Procedee de inventariere parţială. **[Methods of partial enumeration.]** *Rev. Pădurilor* 1957 (8), (501–7).

Describes Bitterlich's angle-count method, the use of the Relascope etc., and compares results with those of total enumerations.

777. BRISCOE, C. B. **Calculation of local volume factors for relascope cruising.** *LSU For. Note La. agric. Exp. Sta.* No. 16, 1957. pp. 2. 2 refs.

Local volume factors are obtained by sampling local volume/b.a. ratios for each merchantable length class recognized; the method of obtaining this information from relascope cruises is described, and an example worked out.

778. BRISCOE, C. B. **Stand table construction from relascope plots.** *LSU For. Note La. agric. Exp. Sta.* No. 15, 1957. pp. 2. 1 ref.

779. DAWKINS, H. C. **Some results of stratified random sampling of tropical high-forest.** Uganda Forest Department, Entebbe. 1957. pp. 12. 11 refs. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

Uganda has been using stratified random sampling for assessment of natural forest for 7 years and has sampled over 220,000 acres. The method of design, measurement and analysis was published in 1954, but certain more recent experiences of wide application are described here.

The stratified random design is preferred to systematic, especially when blocks are purposively

sited. Single-variable volume tables are only satisfactory in relatively uniform forests, and two-variable ones are now needed. Skewed distributions are common but can be overcome by transformations. A new and extremely simple calculation of lower confidence limit or RME is described and named the method of lesser variates. *Author's summary.*

780. POLYCARPOU, A. **The application of continuous inventory on a sampling basis in Cyprus.** Forest Department, Nicosia. 1957. pp. 26. 11 refs. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

The method developed for inventory of *Pinus halepensis* var. *brutia* in Cyprus consists essentially in the application of the *méthode du contrôle* on a sampling basis, the sampling units being permanent plots of ca. 6 acres, selected as a result of stratification based on aerial photographs. The enumeration design and collection of field data, computation of growing stock and increment, costs, and statistical and mensurational considerations are discussed in some detail.

781. POLYCARPOU, A. **The scope of aerial photography in stratification for sampling purposes in the *Pinus brutia* forests of Cyprus.** Forest Department, Nicosia. 1957. pp. 29. 6 refs. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

Contains chapters on (1) the basis of stratification, (2) identification of strata on aerial photographs, (3) transfer of detail on to maps and determination of the strata areas, with a number of statistical appendixes.

782. GROSSMANN, H. Die Dauerwaldversuchsfläche Gross-Ziethen. **[The *Dauerwald* research area, Gross-Ziethen.]** *Arch. Forstw.* 6 (2/3), 1957 (73–108). 16 refs. [G.g.russ.e.]

A detailed comparison of enumerations by complete calipering (recorded in 50 × 50 m. blocks) and by the circular plot method [see *F.A.* 16 No. 3257] with one plot per ¼, ½, and 1 ha., and of the volumes derived therefrom by Laer's form-height method and Kräuter's forest height tariff [see *F.A.* 17 No. 3099] carried out in 47·29 ha. of *Dauerwald* with 92% of the timber volume in *Pinus sylvestris.* The area was too small to allow more than a test, but, as expected, the more even distribution of inhomogeneity in the uneven-aged *Dauerwald,* as compared with the larger blocks of even-aged stands in the area where the method originated, reduced the sampling error in the determination of total volume, and the data obtained for diameter-class and species distribution and quality structure were at least as accurate as those for even-aged stands.

783. PRODAN, M. Die Absteckung der Probekreise. **[Laying out circular sample plots.]** *Forstarchiv* 28 (8/9), 1957 (195–6). 3 refs. [G.]

Three measuring rods of German make, and the procedure for using them, are described. Data are given on the time and manpower required and on the cost of each.

525. Volume by Assortments. Merchantable Volume

784. ANDERSEN, K. F., KNUDSEN, M. V., and WINTHER, C. M. En kubiktabel for imprægneringsmaster. **[A volume table for poles for impregnation [transmission poles etc.].]** *Dansk Skovforen. Tidsskr.* 41 (1), 1956 (1–15). [Dan.e.]

A volume table based on measurements at 7 wood-preserving centres, of 1500 poles, mainly Norway Spruce, representative of the range of quality and dimensions used and of different parts of the country, gives volumes per piece for lengths 6·7–18·2 m., top diam. o.b. 12–23 cm. The standard deviation was 7·8%. Individual differences are probably due partly to local deviations in form factor (attributable to site, thinning etc.) and partly to the fact that ca. ¼ of the stems were cross-cut at some distance from the butt. A comparison of the table with existing Spruce volume tables based on top diameter suggests that small and medium-sized poles taper less than sawlogs.

785. **[Yield of chipboard material in light-hardwood forest.]** *Rep. For. Dep. Sarawak 1956,* 1957 (22).

In order to ascertain roughly the yield of chipboard material that can be obtained from *alan bunga* (light-hardwood) forest, a typical acre was selected and found to contain 68 trees of *Shorea albida* (d.b.h. 6–33 in., average 19·5), 44 trees of *Gonystylus bancanus* (3–12 in., average 8·3) and 44 others mainly *Palaquium* spp. (2–7 in.). All trees were felled and material suitable for chipboard manufacture carefully measured—a total of 7863 cu. ft., equivalent to 80–90 tons weight of oven-dry wood. Of the 68 *S. albida* trees, 42 were hollow and useless as sawlogs, but this defect reduced the total volume of chipboard material only by 4–5%.

526. Log Measurement. Scaling

786. BATORI, S. M. **Wood equivalents: logs to boards, plywoods, and products from residuals.** *Pap. Amer. Soc. mech. Engrs.* No. 57-*SA*-88, 1957. pp. [1] + 8. P.R.

An attempt to provide the engineer with a set of equivalents (sawmill logs with and without utilization of waste peeler, and pulpwood logs: volume, weight, chip, hogged-fuel, heat and lumber-tally equivalents) based on current practices in the belt from California to British Columbia (mostly Fir, but also Hemlock, Spruce, Red Cedar, Ponderosa and Sugar Pine.

527. Solid Volume of Stacked Products (including Converting Factors)

See No. 475.

53. Special Measurements of Trees and Stands (Crown Dimensions, Stand Density etc.)

See also No. 242.

787. STOECKELER, J. H., and OLSEN, L. P. **A regression equation relating diameter growth rate of Jack Pine to live crown percent.** *J. For.* 55 (6), 1957 (467).

Based on data from 174 trees in a dense 26-year-old stand of Jack Pine in central Wisconsin, a graph is drawn for the equation $y = 0{\cdot}2030 + 0{\cdot}0301x - 0{\cdot}0002x^2$. The correlation coefficient is significant at the 1% level.

788. MORISAWA, M., and TAIRA, K. **[Estimation of the transpiration of trees and stands. (Report 2). The amount of foliage of Beech [*F. crenata*?] of Gunma District.]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 95, 1957 (121–8). 5 refs. [Jap.jap.e.]

Tabulates, for 21 sample trees 2·5–7·6 cm. in d.b.h. (*D*), the tree height, clear bole and crown length, crown projection (*C*) and fresh leaf weight in kg. (*W*) and develops the equation: log $W = 1{\cdot}85 \log D - 1{\cdot}38$ [cf. *F.A.* 15 No. 3882]. Air- and oven-dry leaves are respectively 52 and 46% of fresh weight. With crown density constant, the ratio W/C appears to increase with *D*, and where transpiration is proportional to *W* the presumption is admissible that it increases with the tree's growth.

54. Assessment of Site Quality

See also Nos. 43–5, 210, 801, 818, 848.

789. PETRESCU, L. In legătură cu folosirea 'înălțimii superioare' in lucrările de taxație forestieră. **[The use of 'top height' in yield studies.]** *Rev. Pădurilor* 1957 (7), (452–5). 6 refs. [Rum.]

Discusses the possibility of using 'top height' (mean height of the tallest trees in a stand), for the purpose of yield-table construction, yield regulation etc. Some data are given on the relation of 'top height' to mean height in Black Poplar stands.

790. GREGORY, R. A. **The accuracy of Southeast Alaska site index estimates associated with variable numbers of height measurements.** *Tech. Note Alaska For. Res. Cent.* No. 38, 1957. pp. 2. 1 ref.

Tabulated figures are given showing the expected errors in site indices for 3–8 height measurements. Estimates were found to vary according to whether Sitka Spruce or Western Hemlock had been used, and in using yield tables, site indices based on an equal number of measurements from each species should be used.

791. GEVORKIANTZ, S. **Site index curves for Tamarack in the Lake States.** *Tech. Note Lake St. For. Exp. Sta.* No. 498, 1957. pp. 2.

792. MCLINTOCK, T. F., and BICKFORD, C. A. **A proposed site index for Red Spruce in the Northeast [of the U.S.A.].** *Sta. Pap. Ntheast. For. Exp. Sta.* No. 93, 1957. pp. 30. 40 refs.

From measurements of 910 dominants a graph is drawn up based on the equation $y = 4{\cdot}5 + h(1-e^{-ax})$, where y = total height, x = d.b.h., h and a are parameters determined from the data, and e = the base of natural logarithms. Applications are discussed.

793. DOOLITTLE, W. T. **Site index of Scarlet and Black Oak in relation to Southern Appalachian soil and topography.** *For. Sci.* 3 (2), 1957 (114–24). 19 refs.

As there was no significant difference between the site indices of *Q. coccinea* and *Q. velutina*, growing on the same plots, data on site index and 20 soil properties from 110 plots were combined. The only properties of significant value for predicting site index, *Y* (based on an age of 50 years), are used in the best expression: $Y = 38{\cdot}7690 + 8{\cdot}8057$ (depth of A horizon in in.) $- 0{\cdot}0477$ (slope position [bottom 0, ridge top 100%]) $- 0{\cdot}4620$ (sand [0·02–2·0 mm.]% in A horizon). The standard error of the mean *Y* value (63·76) is $\pm$ 2·65 ft. Site index increases also with humus type (not readily measurable) through mor, shallow and deep duff mulls, deep and very deep mulls.

794. THOMSON, G. W. **Growth of plantation Black Walnut in southeastern Iowa as related to certain soil properties.** *Abstr. of thesis*, in *Iowa St. Coll. J. Sci.* 31 (3), 1957 (534–5). O.R.E.

In studies on 15- to 17-year-old trees grown on silt loam, positive correlations were found between site index and soil depth, pH, available N, K and Ca, and other soil properties, and negative ones with Fe and Al content. Positive correlations were also found between site index and content of Ca, Mg, K and N in leaves.

795. HIRAMA, S., and KIRIYAMA, C. **[Investigations on the method of estimation of forest land productivity. Parts I to III.]** *J. Jap. For. Soc.* 37 (4; 5), 1955 (133–9; 175–8); 38 (11), 1956 (428–32). 25 refs. [Jap.jap.e.*e.*]

Parts I and II deal with the method—a multiple regression equation following Gaiser [cf. *F.A.* 13 No. 1433; 18 No. 1974]—and investigate its applicability to stands of *Pinus densiflora*. Part III does the same for *Cryptomeria japonica*, the variables investigated, for which tables and graphs are given, being drainage, depth of soil, depth of topsoil, hardness of subsoil, aspect and angle of slope, and degree of wind exposure.

796. SMITH, J. H. G. **Some factors indicative of site quality for Black Cottonwood (*Populus trichocarpa* Torr. and Gray).** *J. For.* 55 (8), 1957 (578–80). 4 refs.

Climatic influence, topography and soil requirements are discussed in relation to growth of *P. trichocarpa* in British Columbia, and vegetation indicative of site classes I, II and III is listed.

797. CHIRIȚA, C. D. *et al.* Contribuții la studiul și cartarea stațiunilor forestiere. **[The description and mapping of forest sites.]** *Bul. ști. Acad. Repub. rom.* (*Secț. biol.*) 8 (4), 1956 (847–64). 12 refs. [Rum.russ.f.] O.R.S.

Sets out a combination of vegetation type and site quality class to be used for describing and mapping forest sites, and illustrates it with examples from some Rumanian sites.

798. KÅSA, J. Omkring spørsmålet om bonitetsforringelse i skogen. **[The question of a decline in site class in forests.]** *Tidsskr. Skogbr.* 65 (3), 1957 (161–78). 4 refs. [Nor.]

Figures from two well-managed forests (Spruce and Pine) for the last 90 years suggest that increment has fallen off during the period and that this may be attributable to a decline in site class.

55. Age Determination

See Nos. 804–5.

56. Increment. Development and Structure of Stands

See also Nos. 115, 137, 155, 157, 160, 242, 263 *et seq.*, 419 *et seq.*, 455, 847.

799. BAY-SCHMITH, T. Estudio sobre el crecimiento de *Pinus insignis*. **[Study of increment in *P. radiata*.]** *Chile maderero* 5 (3), 1955 (4 . . . 9). [Span.]

Data are presented from stands in the coastal area of Concepción, managed intensively up to the age of 25 years and thereafter neglected, so that any conclusions drawn are not applicable to other types of stand. Graphs are presented showing (1) height, diameter and volume increment of a dominant tree, (2) volume increment/ha., related to age, (3) annual volume increment/ha. by 5-year periods, (4) relationship between total volume/ha. and the volume extracted in 4 thinnings, and (5) annual increment expressed in % of the total volume plotted against the age of the stand. The silvicultural significance of the data is discussed.

800. ERTELD, W. Grundflächenschluss und Zuwachs bei Kiefer, Fichte und Buche. **[The effect of stand density on increment in Pine, Spruce, and Beech.]** *Wiss. Abh. dtsch. Akad. LandwWiss., Berlin* No. 21, 1957. pp. 178. 27 refs. [G.g.]

Presents tables for c.a.i. (for wood > 7 cm. top diam.) and c.a.i. % by age, volume, quality class and density, for (*a*) stands thinned according to proper forestry practice, and (*b*) stands (now frequent in Eastern Germany) with reduced density owing to the removal of the best stems. Data for (*a*) are computed from published figures, those for (*b*) from measurements, including increment borings, diameter distribution curves etc., collected in 819 such badly treated stands. The theoretical assumptions underlying the computations are discussed. Wiedemann's tables have been used throughout as the starting point.

801. WEITZMAN, S., and TRIMBLE, G. R., JR. **Some natural factors that govern the management of Oak.** *Sta. Pap. Ntheast For. Exp. Sta.* No. 88, 1957. pp. 40. 19 refs.

A study was made of 71 plots in well stocked, even-aged Oak stands in the N. Appalachians. Site index was computed from an equation relating site-index curves to aspect, topography, gradient and soil depth [cf. *F.A.* 18 No. 1974]. Data are given on the number of trees per acre by species and site-index class, on natural regeneration and its distribution, growth and yield and relative stumpage value by site-index class. The two most important Oaks are *Q. rubra* and *Q. prinus*. As site quality improves the % of Oak and the variety of other hardwoods increases, but Red Oak increases and Chestnut Oak decreases in proportion to other Oaks. On poorer sites there are more stems per acre, the majority in small unmerchantable diameter classes. Established Oak regeneration is most abundant on medium to poor sites; on better sites competition from faster-growing hardwoods is severe. Average growth rates are determined by tree vigour and site-index classes. On good sites, where trees of low vigour can reach merchantable size, frequent thinnings may be made. Some silvicultural suggestions are made for the different site classes.

561. Increment in Height, Diameter, Basal Area, Form and Quality. Variations and Trends; Dendrochronology

See also Nos. 194–6, 787.

802. LIMING, F. G. **Homemade dendrometers.** *J. For.* 55 (8), 1957 (575–7).

Gives details of an easily constructed dendrometer consisting of an aluminium or zinc band, coiled springs and a steel template with notched measurements. It will measure small changes in diameter accurately to $\frac{1}{100}$ in. It is not suitable for trees < 3 in. in diam.

803. KUROIWA, K. **[Daily growth curve of *Paulownia* (I). On the 'mirror dendrometer'.]** *J. Jap. For. Soc.* 39 (3), 1957 (89–91). 4 refs. [Jap.jap.e.]

The instrument, combining a lamp scale with Reineke's precision dendrometer, is described. It gives magnifications up to > 20,000. Complete concurrence in the growth curves of 2 trees over the 24 hours is shown graphically. Disadvantages are: the requirement of constant presence of an observer at the instrument; errors due to shock or wind buffeting; several adjustments of the mirror may be required during a set of observations. [Cf. *F.A.* 16 No. 3270.]

804. BEAUFAIT, W. R., and NELSON, T. C. **Ring counts in second-growth Baldcypress.** *J. For.* 55 (8), 1957 (588).

Visual examination of increment cores from 63 trees of *Taxodium distichum* from 3 plantations of different ages gave an estimate of rings far above the number of actual growth-rings. Discrepancies arose because dark resinous bands, possibly associated with soil moisture fluctuations, were included in the count. The true rings can be clearly seen if the increment core is cut down its long axis and examined under a microscope.

805. ROSE, A. H. **A technique for differentiating annual rings in increment cores from diffuse porous woods.** *For. Chron.* 33 (2), 1957 (139–40). 1 ref.

During a study of suppressed radial growth in *Populus tremuloides*, a technique was developed that requires little core preparation and allows clear differentiation of even the narrowest rings. The cores are made translucent by replacing the air in the wood by light oil, and they are examined, while immersed in oil, by a low-power microscope using transmitted light. Several cores may be treated at once and the technique works equally well with dry or green cores.

806. KOCH, H. G. Durchmesserzuwachserhebungen an Waldbäumen zum Nachweis von Geländeklimaeinflüssen. **[Diameter increment in relation to local climate.]** *Arch. Forstw.* 5 (9/10), 1956 (673–89). 11 refs. [G.g.]

Using extensive ring-count data for Spruce and Pine in Thuringia, covering the period 1901–25, the effects of aspect (and through it, temperature) on yield is statistically examined. The weather-controlled variation in diameter increment decreases with age of tree, and also with increasing rainfall to a minimum at 650 m. alt., where drought years practically cease to affect yield. Owing to differences in local radiation, better growth is found at higher altitudes on southern, and at lower altitudes on northern aspects, the differences being significant. Such effects are most strongly shown at the higher altitudes and many signs indicate an effective bioclimatic boundary at 600–650 m. alt.

807. EKLUND, B. Om granens årsringsvariationer inom mellersta Norrland och deras samband med klimatet. **[Annual-ring variation of Spruce in central Norrland and its relation to climate.]** *Medd. SkogsforsknInst., Stockh.* 47 (1), 1957. pp. 63. 32 refs. [Sw.sw.e.] Price *Kr.*4.

The material examined came from 908 sample trees from the district between 62° and 64° N, and covers the period 1900–1944. On 460 sample trees early and late wood were measured separately. Annual ring indexes [see *F.A.* 16 No. 4405] were constructed for the whole material, with separate early- and late-wood indexes. Statistical analysis of the material showed that annual-ring variation is directly related to the temperature in the period mid-May to late July of the current year. High temperatures in late July and August, however, lead to lower values of the annual-ring index of the following year. A large crop of 1-year cones in the current or preceding year also leads to lower values. Only a slight correlation was found between rainfall and annual-ring index. Widths of both early and late wood are closely related to temperature in the early summer, and width of late wood is only slightly affected by temperature in late July and early August when late wood is actually formed. The number of days with maximum temperature above 16° C. in the period 16 May–31 July is the temperature variable most closely related to annual-ring width. Equations are given showing the relationship of ring width to climatic factors and cone crops for 4 tree classes based on dominance.

808. IACOVLEV, A. Cîteva observaţii referitoare la influenţa secetei şi a formei de cultură asupra creştarii şi texturii lemnului de brad. **[The influence of drought and the form of stand on the increment and late-wood formation of *Abies alba*.]** *Rev. Pădurilor* 1956 (9), (612–3). [Rum.]

A study was made of 5 trees of *A. alba* of each of two kinds (*a*) grown in isolation, (*b*) dominants in a mixed stand. All were 60 years old. The object was to determine the effect on increment of the severe drought of 1945–46, and also the effect of growing alone or in a stand. Tabulated data are given for (*a*) and (*b*) on: (1) % diam. increment before, during, and after the drought; (2) differences in height, diam. and volume increment over 20 years; (3) mean width of annual ring and late-wood % over the 20-year period. In general, (*a*) showed 16% less height growth, 44% more d.b.h. growth, and 55% more volume growth than (*b*); mean width of annual ring was 66% greater, but % late wood 59% less in (*a*) than in (*b*).

809. TRYON, E. H. CANTRELL, J. O., and CARVELL, K. L. **Effect of precipitation and temperature on increment of Yellow-Poplar.** *For. Sci.* 3 (1), 1957 (32–44). 43 refs.

Yellow-poplar [*Liriodendron tulipifera*] growing on a well drained hillside, and showing year-to-year variation in ring width, was investigated to determine the effect of precipitation and temperature periods on annual radial and height increment. May–June precipitation was directly related to ring width. Precipitation for the same period was also related to annual height increment, although the relationship was poorer than for ring width. Temperature for the present and past seasons, and precipitation for the past season, showed no relationship to either annual radial or height increment. The annual variations in diameter and height increment as one progresses from optimum to adverse sites is discussed. It is suggested that as a site factor, or factors, become limiting, radial increment responds to the change to a greater degree than height increment. *Authors' summary.*

810. PETRINI, S. En överblick över metodiken vid tillväxtprocentberäkning. **[A review of methods of calculating increment %.]** *Norrlands SkogsvFörb. Tidskr.* 1957 (1), (111–20). [Sw.]

Discusses the calculation, using compound interest, of mean increment % from sample-tree data by age classes weighted by enumeration data on basal area or volume within diameter classes. Discusses the effects of mortality and thinning in young stands, and recommends further research.

811. KRÄUTER, G. Waldhöhentarif und Zuwachsermittlung. **[The 'forest height tariff' and increment determination.]** *Forst u. Jagd* 6 (3), 1956 (129–30). 6 refs. [G.g.]

Presents a method based on a table [not printed] of volume increment %s per cm. radial increment, by diameter classes and groups of species, designed for simplified application of the author's methods [cf. *F.A.* 17 No. 3099].

562. Volume Increment

See also Nos. 780, 810–1, 850.

812. KRÄUTER, G. Zu einigen Fragen der Massenzuwachsermittlung. **[Some problems in the determination of volume increment.]** *Arch. Forstw.* 5 (11/12), 1956 (753–68). 13 refs. [G.g.]

Discusses the bases, and particularly the complication introduced by the b.a. increment of the bark, for which more direct observations are required. The volumes of Beech and Pine stands calculated from Loetsch's unit-height classes, volume tables, Laer's form height and Kräuter's forest height tariff [see *F.A.* 17 No. 3099] and the volume increments derived from Loetsch's, Prodan's and Kräuter's methods are compared, the last two from data for 24 sample plots. Kräuter's method gave a figure 2% below Prodan's. The example shows that volume and volume increment calculation from

a single unsubdivided tariff can lead to considerable error for a single stand. The use of a subdivided tariff that differentiates species and species groups so greatly reduces error that sufficiently reliable figures become available even for single stands.

813. GROSSMANN, H. Untersuchungen zur Zuwachsermittlung auf der Versuchsfläche für Holzvorratsaufnahmen in Spechthausen. **[Investigations on increment determination in the enumeration research area in Spechthausen.]** *Arch. Forstw.* 5 (11/12), 1956 (872–97). 22 refs. [G.g.]

A statistical exposition of the groundwork on which the method outlined [see *F.A.* 18 No. 3203] was based. Some conclusions from an examination of 4000 increment cores classified by species, site, d.b.h. and crown quality class are as follows: Sampling with one plot per ½ or ¼ ha. was satisfactory in determining increment %; with one plot/ha. variation was too great [cf. *F.A.* 16 No. 3257]. Within the site and diameter class, the ratios of volume increment for the *a*-, *b*- and *c*-quality crowns of Pine and Beech respectively, were 3 : 2 : 1 and 2 : 1·5 : 1. Decrease in increment % with increase in diameter class was greatest for *a* and least for *c*. Pine grew best on sites influenced by groundwater, and Beech on loam overlain with sand. The more strictly the data on species are divided according to site and diameter class and crown quality, before calculating the total for an area, the clearer will be the expression of differences in increment, and the smaller the sampling error.

814. NISHIZAWA, M., and MANABE, A. **[Direct estimation of stand increments. (III). Individual tree sampling.]** *J. Jap. For. Soc.* 39 (6), 1957 (214–20). [Jap.jap.e.]

Past (1), and present (2), d.b.h. and volumes (tabulated from increment borings and volume tables) were used as the dependent variables in the volume equations,

$$V = a + b\,D^2H,\ V = a + b\,D^2,\ V = a\,D^b$$

from which stand increment (I) was estimated by the simple regression method. The equations gave similar results but the use of

$$I = a + b\,D^2, \text{ and } V = a\,D^b$$

is recommended. Data are from a 30-stem Japanese Larch sample plot. [Cf. *F.A.* 18 No. 4446.]

815. KER, J. W., and SMITH, J. H. G. **Conference on continuous forest control with reference to the University Research Forest at Haney.** University of British Columbia, Vancouver. 1956. pp. 5 + 2.

Describes methods suitable for making periodic enumerations, including the establishment and measurement of permanent sample plots randomly allotted within broad strata, together with suggested coding for punched cards.

565. Sample-Plot Technique

See No. 815.

566. Yield Tables and Their Construction

See also No. 411.

816. NYYSSÖNEN, A. Männikön tuotoksesta ja kasvatuksesta. **[Yield and thinning of Scots Pine stands.]** *Metsät. Aikak.* 1957 (3), (49–53, 56). 8 refs. [Fi.e.e.]

Presents tables showing stand development in terms of sawtimber, pulpwood and fuelwood, and amounts removed in thinning, at different ages of stands on 3 Cajander site types, and recommends that b.a. after thinning should be 20 sq. m./ha. for good Pine sites and less on poorer ones, and 25 sq. m. for Spruce on better sites in S. Finland.

817. VUOKILA, Y. Hoidetun kuusikon puutavarain tuotoksesta. **[The yield in terms of different timber products from managed Spruce stands.]** *Metsät. Aikak.* 1957 (3), (53–7). [Fi.e.e.]

Results of studies on Spruce stands of different ages, thinned from below, on Cajander's MT and OMT forest types, are presented in graphs and tables. [Cf. preceding abstract.]

818. HOFFMANN, J. Zur ertragskundlichen Auswertung der Ergebnisse der Standortskartierung. **[Yield studies based on the results of site mapping.]** *Forst u. Jagd* 6 (9), 1956 (422–5). 7 refs. [G.]

A discussion of the deviation of local stand-development patterns from yield-table averages, illustrated by diameter and height development curves for Spruce in the Thüringer Wald on fresh podzolic brown forest soil, which show a similarity to yield-table curves for yield class I up to ca. 50 years, but flatten out afterwards. The data used were obtained from 40 temporary sample plots.

819. SUDARMO, M. K. Tabel-tegakan sementara dari *Anthocephalus cadamba* Miq. (Djabon). **[Preliminary yield tables for *A. cadamba*.]** *Commun. For. Res. Inst., Bogor* No. 59, 1957. pp. 13. [Jav.e.]

567. Stand Tables

See No. 778.

568. Other Mensurational Studies of Stand Constitution and Changes Therein. Distribution of Growth by Tree Classes etc.

See also Nos. 236, 244, 841.

820. POPESCU-ZELETIN, I., and PETRESCU, L. Contribuţii la cunoaşterea creşterii arboretelor virgine. **[Increment in virgin stands.]** *Bul. şti. Acad. Repub. rom.* (*Secţ. biol.*) 8 (4), 1956 (865–80). 8 refs. [Rum.russ.f.] O.R.S.

A study was made of permanent sample plots that had been enumerated in 1949 and again in 1955. During the period between the two enumerations, many trees had been destroyed by windthrow (13–32% of conifers and 18–67% of Beech). Most intense competition was apparent at the pole stage (3–10 cm. diam.), during which 56–92% of conifers and 82–98% of Beech died. Distribution of trees by diam. classes was much the same as that in selection forest. The number of trees > 50 cm. in diameter

remained constant. Diam. increment was ca. 1 cm. in 6 years for the majority of trees, higher rates (4–6 cm.) being confined to medium-sized trees. As in selection forest, height growth was closely correlated with diam. growth. There was a general decline during the period in both number and total volume of trees.

58. Surveying and Mapping. Aerial Surveys

See also Nos. 780–1, 842.

821. MILLER, R. G. **The use of aerial photographs in forestry in British Colonies.** Colonial Office, London. 1957. pp. 6. 6 refs. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

822. FRANCIS, D. A. **The use of aerial photographs in tropical forests.** *Unasylva* 11 (3), 1957 (102–9).

Discusses the peculiar problems of aerial photography, interpretation, and mapping in tropical conditions.

823. AUNG MYINT, U. **The use of aerial survey in managing Burma forests.** *Burmese For.* 6 (2), 1957 (180–7 + 1 plate). 8 refs.

Indicates areas already covered by aerial surveys, methods of photography, interpretation, mapping etc.

824. CAHUSAC, A. B. **Forest mapping from aerial photographs in Uganda.** Uganda Forest Department, Entebbe. 1957. pp. 5. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

825. CHOATE, G. A. **A selected annotated bibliography of aerial photo interpretation keys to forests and other natural vegetation.** *J. For.* 55 (7), 1957 (513–5).

Most of the keys listed were developed for use in forest surveys in the U.S.A.

826. SIMS, W. G., and HALL, N. **The testing of candidates for training as air photo interpreters.** Commonwealth Forestry and Timber Bureau, Canberra. 1956. pp. 12 + 6 plates, 1 map. 7 refs.

827. MOESSNER, K. E. **How important is relief in area estimates from dot sampling on aerial photos?** *Res. Pap. Intermt. For. Range Exp. Sta.* No. 42, 1957. pp. 16. 4 refs.

A study was made in S. Idaho over forest land with altitudes ranging from 2000 to 9000 ft., comparing data from dot samples located by simple photo templet with data obtained from samples located by map and transferred to aerial photos by radial line plot. Ten strips were selected and 10 consecutive photos taken on each strip. A total of 400 dot samples was made for each procedure and methods of locating them are described. Forest types and stand size-classes were classified; mean stand height, mean crown diameter and crown coverage were measured and volume per acre was estimated. No significant differences due to sampling bias were detected: (*a*) in the location of dots by photo centre or by map, (*b*) for cover types, stand size or tree measurements, (*c*) for the position of dots on the photo, and (*d*) for stratification of forest types by elevation. In areas similar to that studied, adjustment of data from dot sampling would seem unnecessary.

828. MOESSNER, K. E. **Relation of minimum area standards to proportions obtained by dot samples of aerial photos.** *Res. Pap. Intermt. For. Range Exp. Sta.* No. 44, 1957. pp. 13. 1 ref.

Comparative estimates of cover-type area from different sizes of minimum sample area were made from 2 samples of 1000 dots each on aerial photos of central Colorado at a scale of 1 : 20,000; the minimum sample areas were (*a*) $\frac{1}{8}$ acre, (*b*) 1 acre, (*c*) 5 acres, (*d*) 10 acres and (*e*) 40 acres. Results indicate that the % of area classified as forest increases with use of a larger minimum area, an increase of ca. 10% being noted between (*a*) and (*c*). A similar increase was also observed for the % of conifers within the forest area. The cost (per 100 dots) was doubled by use of the largest minimum area. In every case except between (*a*) and (*b*), the cost increase was significant at the 1% level.

829. HILDEBRANDT, G. Forsteinrichtungsarbeiten mit Hilfe von Luftbildern. **[The determination of working-plan data with the help of aerial photography.]** *Forst u. Jagd* 7 (2), 1957 (58–64). 9 refs. [G.]

Compares the time taken for delimitation of subcompartments and other smaller units, description of stands etc., on an area of 363 ha. from rather poor aerial photographs, with that taken for the same work by ground methods only, showing considerable savings in time by the former method.

830. ANDERSEN, H. E. **Use of twin low-oblique aerial photographs for forest inventories in Southeast Alaska.** *Photogramm. Engng.* 22 (5), 1956 (930–4). 7 refs. L.S.

To meet economically the divergent requirements of photography for both mapping and forestry purposes, a combination of 1 : 40,000 vertical and 1 : 20,000 twin low-oblique aerial photographs were taken in an aerial survey of Southeast Alaska. The vertical photography was taken with a six-inch camera. Two 12-inch focal length cameras were tilted right and left at 18° from the vertical. These oblique photographs are being successfully used to carry out forest inventories. Forest and other land-class areas are obtained by either direct estimates from the aerial photographs or by measurements made on timber-cover maps constructed from the aerial photographs. In the first case, a sample of points or plots is classified by photo-interpretation to obtain the percentage or proportion of each class. The proportions are then applied to total land area to determine area in each class. A light plane is used to check photo-interpretation in the field. Sampling error, as well as the most efficient combination of photo and ground plots, can be computed. The oblique photographs have made it

possible to carry out forest inventories needed for the development of forest industries in this region. *Author's summary.*

831. Hildebrandt, G. Zur Frage des Bildmassstabes und der Filmwahl bei Luftbildaufnahmen für forstliche Zwecke. **[Choice of photo scale and film for aerial photography of forests.]** *Arch. Forstw.* 6 (4), 1957 (285–306). 55 refs. [G.g.russ.e.]

The summary recommendations, particularized in the text, are: for management and survey, 1 : 12,000 on contacts 18 × 18 cm., for enlargement (×2) where required; in spring panchromatic or orthochromatic, in summer infra-red with minus-blue filter, and in autumn panchromatic film. Most of the references are later than those given by Sisam and Spurr [see *F.A.* 9 No. 1948; 10 No. 2336].

832. Lawrence, P. R. **Testing the efficiency of photo-interpretation as an aid to forest inventory.** Government Printer, Tasmania. 1957. pp. 24. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

Methods used by the Tasmanian Forestry Commission are described briefly. The ability of interpreters to differentiate volume classes by classifying Eucalypt forests into height and density classes was tested for 5 localities (1 regrowth and 4 old-growth areas) by analysis of variance. Height and density classifications proved substantially correct when compared with field data. Density classification by % crown cover and the system of regrowth density classifications were effective means of separating volume classes. Density classification by tree counting was only effective as between the lowest level of density and the other classes. The height classification was also effective in the regrowth and relatively undamaged old-growth forest areas, but less effective in the northern areas which had been selectively logged and often burnt. Classification of regrowth areas by the height classes of residual old-growth trees was a highly effective means of separating site classes. It is concluded that the size of field sample needed for volume estimation at a given degree of accuracy is greatly reduced by sampling within the stratification achieved by the photo-interpreter [cf. *F.A.* 16 No. 4385]. *From author's summary.*

833. Collins, J. R. **A check on the accuracy of tree heights taken from aerial photographs.** *For. Chron.* 33 (2), 1957 (168–9).

Ca. 40 tree heights (81–92 ft.) were measured by parallax bar from aerial photographs and checked against ground measurements. The S.E. of individual height estimates for all trees was ± 6·1 ft., and for dominant trees was ± 5·1 ft. Estimates of maximum height for site classification can be made with excellent reliability by this method. *From author's summary.*

834. Moessner, K. E. **A parallax wedge for mountainous areas.** *Res. Note Intermt. For. Range Exp. Sta.* No. 39, 1956. pp. 2.

A new parallax wedge (illustrated) for use on aerial photographs of mountainous areas has a slightly larger convergence and is 10 in. long; this allows the measurement of 1·08-in. parallax difference.

835. Cromer, D. A. N., and Brown, A. G. **Plantation inventories with aerial photographs and angle-count sampling.** *Bull. For. Timb. Bur. Aust.* No. 34, 1956. pp. 23. 16 refs.

An experiment made with aerial photos (scale ca. 10 miles/inch) of *Pinus radiata* plantations in the Australian Commonwealth Territory showed that stands could be classified from the photos, estimates of stand volume obtained by the angle-count method in the different classes, and stand volume tables constructed from the data so obtained. The method of compiling tables and tests of their accuracy are described.

836. Moessner, K. E. **Preliminary aerial volume tables for conifer stands in the Rocky Mountains.** *Res. Pap. Intermt. For. Range Exp. Sta.* No. 41, 1957. pp. 17.

The tables were compiled from measurements on aerial photos of average total height, average crown diam. and crown coverage on circular one-acre plots, and from field estimates of bd. ft. and cu. ft. volume on $\frac{1}{5}$-acre plots (concentric with the one-acre plots) for trees of > 11 in. d.b.h. and on $\frac{1}{50}$-acre plots for trees < 11 in. d.b.h. Species found on the plots were Douglas Fir, Engelmann Spruce, Alpine Fir, Lodgepole Pine, Limber Pine, and some Aspen; measurements were made on 168 plots distributed at random in forests in S.E. Idaho, S.W. Wyoming and N.E. Utah. On 60 plots in pure Lodgepole Pine stands, a bd. ft. table was compiled separately, as the volume was likely to be less than on mixed conifer plots. Tests of the tables indicate that photo estimates made with 10–20 plots seldom vary significantly from field estimates. Where 4 or 5 plots are grouped, the correlation between field and photo volumes is often > 90%.

837. Ohtomo, E., and Nakajima, I. **Research on the method of forest inventory by the use of aerial photographs.** *J. Jap. For. Soc.* 38 (10), 1956 (379–88). [E.e.jap.]

A combination survey using aerial photographs and sample-plot data from the ground was made, and volume and number of trees by species and by strata (artificial coniferous and natural deciduous forests) were determined for ca. 600 ha. Mean errors were low and the combined method was found satisfactory in cost, labour, time, and accuracy. The quality of photographs needed, and problems of determining area on the map (e.g. by planimeter) and selecting plot size are discussed.

838. Stoeckeler, E. G., and Young, H. E. **Application of airphoto techniques in planning logging road networks.** *Tech. Note Univ. Me. For. Dep.* No. 44, 1957. pp. 4.

6. FOREST MANAGEMENT. BUSINESS ECONOMICS OF FORESTRY. ADMINISTRATION AND ORGANIZATION OF FOREST ENTERPRISES

61. Forest Management: General, Theory and Principles

See also No. 397.

839. NUNN, G. W. M. **Forest management in the Eucalypt forests of the south-west of Western Australia.** Government Printer, Perth, W. A. 1957. pp. 14 + 1 map. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

840. SUSMEL, L. Sul trattamento delle abetine disetanee della Carnia. **[The management of the uneven-aged mixed conifer stands of Carnia [,Udine].]** *Monti e Boschi* 8 (8), 1957 (352–64). [It.f.e.]

With particular reference to minimum stand density, intensity of cutting, and the economic and ecological aspects of merchantable diameter. The forest is mainly a mixture of Norway Spruce and Silver Fir with some Beech.

841. PATRONE, G. Ricerche sulla normalità della fustaia da dirado di Paularo. **[Studies on the normality of the selection forest at Paularo.]** *Ann. Accad. ital. Sci. for.* 5, 1956 (381–405 + 4 photos). [It.f.]

This forest in the Eastern Alps, of mixed Spruce, Silver Fir and Beech, managed for centuries as a selection forest, was studied on a number of sample plots, and the data are presented and discussed in detail. Values were determined for mean volume (P_n), mean b.a. (B), and increment % (P) for exploitable diameters of 40, 50, and 55 cm. It was also established that in these stands the coefficient K (ratio of number of trees in one diameter class to that in the next diameter class) was not appreciably affected by exploitable diameter, and approximated to 1·40. The recruitment period for trees between 40 and 55 cm. was ca. 10 years.

842. DAWKINS, H. C. **The management of tropical high-forest: recent developments in Uganda.** Uganda Forest Department, Entebbe. 1957. pp. 10. 14 refs. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

Uganda has been applying aerial photography, statistical sampling, factorial experiments and contact arboricides to the management of its million acres of tropical high-forest. Much of the work has still to produce results, though some field and research techniques have already stood the test of several years' application. The main advance has been the recognition of the value of quantitative applied ecology, and its simplification for practice. Future development is likely to be mainly in the field of quantitative diagnosis, increment study and fuller utilization. *Author's summary.*

843. GORDON, W. A. **The problem of unmerchantable species in the management of tropical timbers.** Forestry Commission, London. 1957. pp. 6. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

A discussion of the principles of management that may lead to fuller utilization of available tropical timbers.

844. OSMASTON, F. C. **The planning of a management unit.** Forestry Commission, London. 1957. pp. 8. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

For sustained yields to reach their highest value, the correct selection of working circles, based on site conditions, growing stock and demand, is necessary. But it is unnecessary, and may be undesirable, for a working-plan area to coincide with the limits of either a forest unit or a territorial charge. To satisfy or develop a special demand or a large industry, one special working circle in one plan may be desirable, and that working circle may be distributed in several felling series over a number of forest units. But for local demands, two or more working circles in one working plan for each forest unit or territorial charge are desirable. Working-plan areas in a region can also be allotted for management to big industry, which would be responsible for its own working circles to satisfy the terms of the lease from the State. *Author's summary.*

62. Working Plans. Annual or Periodic Yield. Yield Regulation

See also Nos. 829, 1231.

845. DIER, H. V. S. **The problems of management of large even-aged stands.** *Arbor, Aberdeen* 3 (1), 1957 (8–12).

Discusses the management problems presented by the Forestry Commission's large even-aged conifer plantations, and possible methods of conversion to 'normal' structure, and gives some details of working plans for two such forests (Tentsmuir and Drummond Hill) in Scotland.

846. STRIDSBERG, E. Danska planläggningsmetoder. **[Danish methods of planning.]** *Svenska SkogsvFören. Tidskr.* 55 (3), 1957 (295–336). [Sw.]

Compares conditions in Denmark with those in Sweden, and discusses survey methods used, and the preparation of working plans for state and other forests.

847. BLANCKMEISTER, J. Zur Problematik der Holzvorratsinventur und Leistungsprüfung. **[The nature of the problems in growing-stock enumerations and yield determination.]** *Arch. Forstw.* 5 (9/10), 1956 (690–715). 13 refs. [G.]

A general review covering historical development; the nature and content of forest yield determination and control; methods used in Germany and their accuracy in selection, regular and group-selection forests; minimum area and method of grouping stand data for the desired accuracy; the silvicultural potential of the site; and planning aspects.

848. ZINECKER, E. Gesichtspunkte für eine 'einheitliche' Standortsbeurteilung. **[Suggestions for standardized site assessments.]** *Allg. Forstztg.* 67 (21/22), 1956 (277–81). 57 refs. [G.]

Discusses requirements for site descriptions, with suggested definitions of terms to be used for factors of topography, climate, microclimate, and particularly soil factors, e.g. depth of soil, clay or lime content, acidity, humus forms, soil water relations etc.

849. SAGREIYA, K. P. **Yield regulation in selection forests.** [Forest Research Institute, Dehra Dun.] 1957. pp. 19. 9 refs. (Seventh British Commonwealth Conference, Australia and New Zealand, 1957.)

[Cf. *F.A.* 18 No. 796.] Gives a mathematical analysis of the concept underlying Brandis's method and an example of its use, compares the yield by this method and that obtained empirically by other methods and by a mathematically derived formula of Tiwari [see *F.A.* 18 No. 797] and discusses Smythies's safeguarding formula [see *F.A.* 1 p. 66].

850. BOURNE, R. **Memorandum on File No. 10. 1934, Working Plan Circle.** *Burmese For.* 6 (2), 1957 (161–4).

A note on the apparent discrepancies in numbers of Teak in different girth classes, between consecutive enumerations, with discussion of the uncertainties in estimates of natural mortality and periods of recruitment from class to class.

64. Forestry as a Business: General

See also No. 844.

851. LESLIE, A. J. **Cellulose forestry.** *Proc. Aust. Pulp. Pap. Ind. tech. Ass.* 10, 1956 (12–29). 11 refs.

An analysis of requirements for the final product, based on kraft Eucalypt pulp in the Maryvale mill (Australia), leads to the concept of cellulose forestry as the scientific management of forests for the continuous production of wood fibres having the optimum properties for paper making. [Cf. *F.A.* 19 No. 1142.] *From author's summary.*

852. STREYFFERT, T. **Influence of size of ownership and size structure on forest management in Sweden.** *Skr. K. Skogshögsk., Stockh.* No. 23*b*, 1957. pp. 44. [E.e.] Price *Kr.*4.

Distribution of ownership, the size of the holding as a factor in efficiency of management, co-operation between small forest owners, the influence of the form of ownership on policy and investment, forest policy and the suitability of different forms of ownership in relation to public interest.

853. QUILLIARD, M. Un exemple de politique forestière familiale ou cent quarante ans de gestion forestière privée. **[An example of family forest policy, or 140 years of private forest management.]** *Rev. for. franç.* 9 (7), 1957 (555–70 + 1 map). [F.]

An account of G. Quilliard et Cie.'s forest estate in the department of Haute-Marne.

65. Special Business Problems of Timber-Growing. Calculation of Costs and Profitability. Valuation

See also Nos. 340, 397, 1214–6.

854. MOORE, D. **The effects of an expanding economy on the tropical shelterwood system in Trinidad.** Forest Department, Port of Spain. 1957. pp. 8. 4 refs. (Seventh British Commonwealth Forest Conference, Australia and New Zealand, 1957.)

The main economic factors influencing forestry in Trinidad and Tobago are reviewed. The tropical shelterwood technique as practised in Trinidad in 1941 is summarized and it is shown how its development since that date is related to an increasing demand for species formerly of no economic importance. It is probable that the cost of all operations will average less than 1 man-day/acre/year throughout the rotation and at this rate the revenue at present-day prices will be more than double the expenditure. *From author's summary.*

855. **Pine industry seeks realistic timber appraisals.** *Timberman* 58 (9), 1957 (40–2, 92). 3 refs.

An illustrated note comparing stumpage appraisals by the U.S. Forest Service with those of the Western Pine Association Forest Practices Committee in 5 samples of Ponderosa Pine, each of which is broken down to log grades and lumber selling values, to show that valuation by government agencies gives excessively high figures. The committee plans to investigate also overrun, conversion return, logging costs, road construction and manufacturing, as elements used in government timber appraisals.

66. Costing of Logging Operations

See also Nos. 859–60.

856. HOLMSTRÖM, S. Om kostnadsberäkning för traktor och hästarbeten. **[Calculating costs for tractor and horse haulage.]** *Svenska SkogsvFören. Tidskr.* 55 (1), 1957 (45–85). [Sw.]

Figures are given for the comparative use of tractors and horses in Sweden in recent years, and prices etc. used in the cost calculations are discussed. Factors considered in calculating tractor costs are: depreciation, repairs, interest, fuel, grease, insurance, and garage: a table is given showing individual and total costs per year and per hour, for annual use ranging from 400 to 800 hours. Factors in calculating for horses are: depreciation, interest, fodder, tending costs, stabling, veterinary attention, insurance, and harness: a table shows mean costs per year and working day for 50 to 300 working days per year. The comparative efficiency of the two hauling methods is generally discussed, but calculations, based on the data given, must be made for each case, as the choice will depend on size and form of enterprise etc.

857. EISENHAUER, G. Betriebskosten von Radschleppern. **[The operating costs of wheeled tractors.]** *Forstarchiv* 28 (7), 1957 (137–41). 4 refs. [G.g.]

Based on data from 23 tractors with several years' service in forestry, estimated values for calculating operating costs are given and the findings are

compared with those of the various FAO reports [see *F.A.* 18 No. 821]. Results are similar in most cases.

858. STREHLKE, E. G. Holzbringung und Wegebau. **[Skidding wood and road-building.]** *Forstarchiv* 28 (4), 1957 (73–8). [G.]

Includes an example showing how the economic length of lorry road per ha. of forest may be calculated, using a simplified version of Soom's formula [cf. *F.A.* 12 No. 3537], from a comparison of the relative share of skidding costs and costs of road-building and maintenance in the total extraction costs. For Beech or Spruce of site class I, under a given ideal set of assumptions, the theoretical optimum is 15 linear m. of road per ha. It is suggested as a rule of thumb that the economic length of road may be taken as that length at which skidding costs and road costs (per ha. or per cu.m. in both cases) are just equal. This gives a value slightly greater than the theoretical optimum, but is justified by the value of the road for other purposes. In practice allowances will be necessary for site class, shape of area, and topography.

67. Assessment of Financial Results; Bookkeeping and Accountancy; Business Statistics; Short-Term Planning and Financing

859. SCHULZ, K. Der Kostennachweis im Rahmen der forstlichen Erfolgsrechnung. **[Cost accounting in the assessment of financial results in forestry.]** *Arch. Forstw.* 5 (11/12), 1956 (801–10). 3 refs. [G.g.russ.e.]

[Cf. *F.A.* 18 No. 825.] Stresses the importance of cost accounting, with special reference to wages, which make up the largest part of costs. As an example, the average wage cost of logging 1 cu.m. of wood is examined to show (*a*) the kinds of expenses involved and (*b*) the factors determining the amount of this cost. To make comparisons possible, this average cost should be broken down as far as possible into partial costs and the factors controlling each partial cost should be identified.

860. PATTERSON, A. R. **An accounting system for mechanical and motorized equipment.** *Unasylva* 11 (3), 1957 (118–23).

Gives sample forms for keeping accounts of fuel consumption, repairs, mileage, working and idle time etc.

68. Administration and Organization of Forest Enterprises

681. National (Federal, State) Forest Services and Administration

861. MUZZI, S. Cenni storici sull'istituto di sorveglianza e custodia forestale in Italia. **[Historical notes on the protection of forests and the institution of forest guards in Italy.]** *Ital. for. mont.* 12 (1), 1957 (22–58). Many refs. [It.it.f.]

Covers the Roman, medieval, and modern periods, and gives a detailed account of the constitution and work of the Corpo Forestale.

862. **Manual of procedure, Forestry Department. Volume II.** Forest Department, Ghana. Rev. ed., 1957. pp. [32].

Covers forest policy; reservation; general management (exploitation in forest reserves, financing operations, protection, other forest, concessions); management plans; controls, records, and maps.

686. Planning and Organization of Buildings, Transport Installations (Roads etc.)

See Nos. 520–1, 838, 858.

687. Planning and Organization of the Transport of Men, Supplies and Equipment

863. **Scooters for trail travel.** *E. D. Rep. U.S. For. Serv.* No. 46, 1957. pp. 10.

Discusses the use of motor-scooters on forest rides, skidding tracks etc. and describes several types.

864. **Powered duffle carriers.** *E. D. Rep. U.S. For. Serv.* No. 45, 1957. pp. 11.

Describes the development of a prototype motor barrow for transporting supplies along narrow forest tracks.

7. MARKETING. ECONOMICS OF TRANSPORT AND THE FOREST PRODUCTS INDUSTRIES

865. LATHAM, B. **Timber, its development and distribution: a historical survey.** G. G. Harrap & Co. Ltd., London. 1957. pp. 303. Price 25*s*.

Contains sections on the use of timber and the timber trade from ancient Egypt to the present day, the Baltic, U.S.A. and Canada, the Spanish main and Mahogany, Teak and the E. India Company, Oak, sawmilling, the carpenter, timber houses and halls, wooden ships.

866. **Forest industries yearbook. 1957 issue.** *Timberman* 58 (6), 1957 (33–144).

Contains articles covering North American production, analysing trends (in lumber, pulp and plywood) and giving statistics by state, province etc. Brief reviews are included of overseas markets and production in various countries. Articles on road construction include details of the U.S. Forest Service Standard. A directory of N. American forestry officials, experiment stations, associations and forestry schools is appended.

72. The Quantitative Aspects of Marketing. Demand, Consumption and Supply

See also Nos. 854, 874, 1141, 1216.

867. **Timber Bulletin for Europe: Market Review to 31 March 1957: Production, Trade, and Price Statistics January-December 1955 and 1956.** FAO, Rome. 9 (4), 1957. pp. 149. [E.F.]

868. **1956 timber statistics.** Organization for European Economic Co-operation, Paris. 1957. pp. 56. [E.F.]

Sections on sawn softwood, sawn hardwood, railway sleepers, logs, pit-props, and pulpwood, with statistical tables of production, consumption, exports and imports, for member countries.

869. **Statistics on tropical timber for 1955. Imports by O.E.E.C. member countries; production and exports by overseas territories.** O.E.E.C., Paris. 1957. pp. 87. [E.F.]

870. RONGE, K. Sveriges export av trävaror. **[Sweden's exports of wood products.]** *Svenska SkogsvFören. Tidskr.* 55 (3), 1957 (229–44). [Sw.]

Gives figures for timber, pulp and paper for 1955, and tendencies since 1825.

73. Prices

871. PRÜCKNER, R. Untersuchungen zur Holzpreisentwicklung 1905–1955 in Österreich. **[The development of wood prices from 1905–1955 in Austria.]** *Allg. Forstztg.* 68 (5/6), 1957 (73–6). [G.]

Discusses the development of prices for coniferous pulpwood, sound wood, and sawn timber in relation to each other, to comparable prices in Germany and Switzerland, and to labour costs.

74. Trade Policy

872. YOUL, J. W. **The Australian sawmilling industry.** *Aust. Timb. J.* 23 (6), 1957 (4 . . . 42, 113, 115). 1 ref.

Prints *in extenso* the case for protection under articles 291–293 of the Customs Tariff 1933–1956, presented by the author to the Tariff Board.

873. MORGAN, F. D., and BYRNE, J. **The desirability of international quarantine measures for exports and imports of timber and timber products.** Government Printer, Wellington. 1957. pp. 7. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.) [Cf. *F.A.* 19 No. 1102.]

79. Economics of the Forest Products Industries

See also Nos. 867–9, 872, 1017, 1021, 1141, 1175.

874. BRUNET, R.-L. Les statistiques françaises de production forestière. **[French forest-products statistics.]** *Rev. for. franç.* 9 (7), 1957 (583–93). [F.]

Discusses the shortcomings in existing methods of compiling statistics and makes proposals for improved methods.

875. BINNS, L. V. **Report to the Government of India on the development of forest industries in the State of Assam.** Expanded Technical Assistance Program, FAO, Rome. *FAO Report* No. 630, 1957. pp. 83. Limited distribution.

876. WYSS, O. Einige Wirtschaftlichkeitsfragen der Spanplatten-Industrie. **[Some economic problems of the chipboard industry.]** *Holz Roh- u. Werkstoff* 15 (1), 1957 (58–61). [G.g.e.] P.R.

An economic analysis of the industry. Cost of production decreases as the output figure increases. Chipboard production costs amount roughly to ½ of the costs of producing blockboards.

8. FOREST PRODUCTS AND THEIR UTILIZATION

See also Nos. 865, 875, 1259–60.

877. LATHAM, B. **Is present day forest products research meeting the needs of the timber trade?** Forestry Commission, London. 1957. pp. 8. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

The author defines the scope of the terms 'timber trade' and 'forest products research' and examines the functions of the trade in relation to research undertaken to date. The changing needs of the trade in the light of competition from other materials call for a progressive attitude to research needs. He stresses the importance of combined, organized research and development, and discusses design as the link between research and production. Examples of new research projects are given to illustrate the argument. *From author's summary.*

878. SANGAR, O. J. **Is present day forest products research meeting the needs of the forester?** Forestry Commission, London. 1957. pp. 7. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

879. COLLARDET, J. Le Centre Technique du Bois. **[The Centre Technique du Bois.]** *Rev. Bois Appl.* 12 (4), 1957 (39–41). [F.]

Outlines the history of French wood research laboratories with particular reference to the Centre Technique du Bois, founded 1952, with details of its organization and work. [Cf. *For. Abstr.* 17 No. 764.]

880. **Program of work 1957–1958 of the Forest Products Laboratories of Canada, Ottawa and Vancouver.** Forestry Branch, Department of Northern Affairs and National Resources, Canada. 1957. pp. 70.

81. Wood and Bark: Structure and Properties

810. General Information on Woods

See also Nos. 155–7, 160–1, 903.

881. PILCHER, C. E. **Timbers for use in schools.** *Timb. Technol.* 64 (2209; 2210), 1956 (596–9; 645–9).

Includes descriptions of 38 tropical timbers and, as a result of special tests described in the article, gives ratings of their suitability for handicrafts in schools.

882. La page des bois tropicaux. **[Tropical woods.]** *Rev. Bois Appl.* 12 (3; 5–7/8), 1957 (35; 35; 33; 45). [F.]

Avodiré (*Turraeanthus africana*); Wengé (*Millettia laurentii*); Naga (*Brachystegia cynometroides*); Fromager (*Ceiba pentandra*).

883. ARKWRIGHT, P. **Know your timber. (Some imported woods and their characteristics.) Nos. 18–25; 42–43.** *Woodwkg. Ind.* 12 (6–12), 1955 (373; 432; 485; 543; 601; 646; 747); 13 (1), 1956 (41); 14 (7; 8), 1957 (358; 404). P.R.

(18) Tallowwood (*Eucalyptus microcorys*). (19) E. African Olive (*Olea hochstetteri*). (20) Purpleheart (*Peltogyne* spp.). (21) E. African Camphorwood (*Ocotea usambarensis*). (22) Krabak (*Anisoptera* spp.). (23) Ogea (*Daniella ogea*). (24) Baromalli (*Catostemma* spp.). (25) Sterculia (*Sterculia* spp.). (42) Pyinma (*Lagerstroemia speciosa*). (43) African Walnut (*Lovoa klaineana*).

884. MCCOY-HILL, M. **Timbers of Tanganyika.** *Timb. Technol.* 64 (2204; 2205), 1956 (305; 357); 65 (2211; 2219), 1957 (35, 467).

Albizzia glabrescens, A. gummifera, Cordyla africana; Maesopsis eminii, Mitragyna rubrostipulata; Hagenia anthelmintica, Pygeum africanum, Allanblackia stuhlmannii, Baikiaea eminii; Manilkara cuneifolia, Millettia stuhlmannii, Lovoa swynnertonii and *Euphorbia* spp.

885. LAMB, G. N. **Foreign woods.** *Wood, Chicago* 61 (9), 1956 (20); 62 (4; 6), 1957 (16; 16). P.R.

Ramin (*Gonystylus* sp.), Serrette (*Byrsonima spicata*); Apiranga (*Maytenus* spp.), Red Sickingia (*Sickingia tinctoria*); Balsamo (*Myroxylon balsamum*) and Pucte (*Bucida buceras*).

886. **Specimen woods Nos. 259–261.** *Suppls.* to *Wood* 22 (7–9), 1957. Each pp. 2.

Butternut (*Juglans cinerea*), Bombax (*B. buonopozense*), and White Seraya (*Parashorea malaanonan*).

887. D. Drei Afrikanische Nadelhölzer, Zeder, Thed, Podo. **[Three African conifers, *Cedrus atlantica*, *Juniperus procera* and *Podocarpus* spp.]** *Holz-Zbl.* 83 (104), 1957 (1261–2). 6 refs. [G.]

Distribution, description of the tree and wood, properties and uses.

888. ANDERSON, I. V. **Engelmann Spruce—its properties, uses and production.** *Res. Pap. Intermt. For. Range Exp. Sta.* No. 39, 1956. pp. 16. 11 refs.

Presents data on, and discusses, the production and available volume in the Rocky Mt. area, timber quality, mechanical and machining properties, suitability for seasoning and preservative treatment, and main uses.

889. **Properties of thinnings of home-grown Scots Pine (*Pinus sylvestris*). Progress report 3—Consignment No. 900.** Forest Products Research Laboratory, Princes Risborough. 1957. pp. 14 + 9 photos.

Density was similar to that of the first two consignments [see *F.A.* 18 No. 2048], more than half the volume was in grade II and better, giving a good constructional timber equivalent to U/S Baltic Redwood. Nearly 3% was in grade I clear, which would make good joinery timber. Much of the grade III would be suitable for constructional timber.

890. **Properties of thinnings of home-grown Scots Pine (*Pinus sylvestris*). Progress report 4—Consignment No. 903.** Forest Products Research Laboratory, Princes Risborough. 1957. pp. 14 + 7 photos.

Material from Kincardineshire resembled previous consignments in strength. It had a high proportion of encased knots, and showed moderate to severe resin exudation in seasoning. Grade for grade, it could be used for the same purposes as imported Middle Gulf Redwood.

891. BOBROWICZ, E., STEBNICKA, E. and BIELCZYK, S. Budowa i własności drewna dębu. **[Structure and properties of Oak wood.]** *Prace Inst. Tech. Drewna* 2 (3), 1956 (3–93). 39 refs. [Pol.russ. e.] P.R.

A monograph based on data found in Polish and foreign literature supplemented by the authors' own studies. Pt. 1 (Oak and the structure of its wood) provides general information (distribution and range of Oak, types of Oak stands, morphology and growth), and the description of the macroscopic and microscopic structure and of the technical defects of Oak wood. Pt II (Physical and mechanical properties of Oak wood) includes a table of technical properties of Oak wood, compiled from publications by Krzysik, Dąbrowski, Bielcyk, Vanin and Kollman.

892. DUGELAY, A. Le bois d'olivier. **[The wood of *Olea europaea*.]** *Rev. Bois Appl.* 12 (7/8), 1957 (6–9). [F.]

Describes the properties of the wood, its past and present uses and working properties.

893. HUNDLEY, H. G. **Padauk: *Pterocarpus macrocarpus* Kurz.** *Burmese For.* 6 (2), 1957 (223–5 + 2 plates). 5 refs.

Silvicultural characters, distribution and wood properties.

894. GERRY, E., and KRYN, J. M. **Crabwood. *Carapa guianensis* Aubl.** *Rep. U.S. For. Prod. Lab., Madison* No. 1991, 1957. pp. 6 + 2 tbls. 12 refs. P.R.

895. Angueuk. **[*Ongokea gore*.]** *Bois For. Trop.* No. 54, 1957 (23–6). [F.]

896. BANKS, C. H. **Notes on the properties of the timber of South African grown *Eucalyptus pilularis* Sm.** *J. S. Afr. For. Ass.* No. 29, 1957 (56–9). 8 refs.

897. **Properties of Australian timbers. Silver Ash.** *For. Prod. Newslett. C.S.I.R.O. Aust.* No. 233, 1957 (4).

Habit, distribution, timber properties and uses of *Flindersia bourjotiana, F. pubescens* and *F. schottiana.*

811. Structure, Identification

898. **Assessment of wood quality.** *Rep. For. Prod. Aust. 1956/57*, 1957 (6).

A technique has been developed for cutting out radial strips of wood from bark to pith of living trees, from which it is possible to determine cell length, micellar angle, basic density, and longitudinal shrinkage in the early and late wood of successive growth rings. This is being done with specimens of *Pinus elliottii* in order to select trees with good wood quality for breeding purposes.

899. LIESE, W., and MEYER-UHLENRIED, K. H. Zur quantitativen Bestimmung der verschiedenen Zellarten im Holz. **[Quantitative determination of different cell types in wood.]** *Repr.* from *Zeitschrift für wissenschaftliche Mikroskopie und mikroskopische Technik* [*Leipzig*] 63 (5), 1957 (269–75). 5 refs. [G.g.]

Describes a Leitz 'integrating stage' equipped with extra parts so that it can be used to make linear traverses across the section and measure separately the cumulated distances passed in different tissues, from which the proportions by area of the tissues can be calculated.

900. VIKHROV [VIHROV], V. E., and MOSKALEVA, V. E. **Wood anatomy and wood technology.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 3091, 1956. pp. 20 + 8 photos, 1 dgm. 58 refs. Transl. by M. Slade from *Trud. Inst. Les.* 9, 1953 (70–88). [See *F.A.* 15 No. 4003.] Limited distribution. P.R.

901. BAILEY, I. W. **The potentialities and limitations of wood anatomy in the study of the phylogeny and classification of angiosperms.** *J. Arnold Arbor.* 38 (3), 1957 (243–53). 23 refs.

902. CLIFFORD, N. **Timber identification for the builder and architect.** Leonard Hill [Books] Ltd., 9 Eden St., London, N.W.1. 1957. pp. 141 + 32 plates. 4 refs. Price £1. 17*s.* 6*d.*

Comprises a section on timber identification in general; descriptions of 8 common softwoods and 19 common hardwoods (mainly European), with separate keys to the ring-porous and diffuse-porous species; a list of 150 of the better known commercial timbers giving gross characteristics, identification features, suitable uses, properties, and habitat; a tabular list of 250 other timbers of commercial importance showing alternative and botanical names, colour and characteristics, durability and suitable uses, and indexes by alternative and botanical names. Arrangement within the different sections is alphabetical by the commercial or British standard name. Illustrations include photomicrographs of features used in identification, photomicrographs of some 50 of the timbers described, and colour or black-and-white photographs of the surface of 64 of them.

903. LIESE, W. Die wichtigsten mitteleuropäschen Holzarten und ihre Bestimmung nach makroiskopischen Merkmalen. **[Principal central European wood species and their identification by macroscopic features.]** Arbeitsgemeinschaft Holz e.V., Düsseldorf. 1957. pp. 40. 11 refs. [G.] P.R.

Describes general properties and uses of 6 coniferous and 14 broadleaved woods, and gives a table for identification on the basis of macroscopic features (observed in cross-section at a magnification of ca. 10×).

904. KOBAYASHI, Y. **[A card sorting system for the identification of softwoods in Japan.]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 98, 1957 (1–84 + 127 photos). 26 refs. [Jap.jap.e.*e.*]

The physical characters, tracheids, resin ducts, parenchyma, cross-field pitting, rays, colour reaction, family, habitat, durability, termite- and blue-stain resistance, working and mechanical properties and uses are tabulated for 39 Japanese and 41 imported softwoods, with separate tables for the separation of the species of *Abies*, *Picea*, *Pinus* and *Chamaecyparis* and the genera of Taxodiaceae and Cupressaceae.

905. MENON, P. K. B. **Microscopic key for the identification of commercial timbers.** *Malay. Forester* 20 (3), 1957 (162–4).

Gives a tabular key, based on pores, fibres, wood parenchyma, rays and other features, to 22 important Malayan species.

906. BAMBER, R. K. **Identification of some common imported species.** *Tech. Notes For. Comm. (Div. Wood Technol.) N.S.W.* 10 (3/4), 1957 (16–7). 8 refs.

Covers the gross and minute structure, physical characters, standard name and source (Pacific Islands and Malaya), of *Octomeles sumatrana*, *Ficus* spp., *Artocarpus* spp., *Gonystylus* spp., *Alstonia scholaris*, *Dyera costulata*, *Celtis* spp., and *Endospermum* spp., with photographs (×64) of transverse sections.

811.1. Anatomical Elements and Tissues

See also Nos. 420, 470, 972.

907. **Cell wall structure.** *Rep. For. Prod. Aust. 1956/57*, 1957 (5–6).

As a result of optical and electronic microscopy it has been shown that the outer layer of the cell wall consists of two grid systems, each with microfibril bundles intersecting at almost right angles. There is a fine grid adjacent to the primary wall, on which is deposited the coarser grid of similar orientation, the microfibril bundles of the former being 600 Å wide and those of the latter 2000 Å. The innermost system of microfibril bundles of the coarse grid (i.e. nearest the lumen) may be elaborated into a complete lamella. The lattice or grid structure observed is related to the separation of this layer into lamellae during beating; it also forms a basis of explanation of certain aspects of the anisotropy of shrinkage of wood during drying.

908. EMERTON, H. W. **The outer secondary wall of tracheids and fibers: its papermaking significance and its structure.** *Tappi* 40 (7), 1957 (542–7). 28 refs. P.R.

Describes the application of the light and electron microscopes for observing the outer secondary wall. Results of recent studies on the structure of this wall, particularly of Pine kraft tracheids, are reviewed and discussed, with particular reference to its significance in papermaking.

909. LIESE, W. Beitrag zur Warzenstruktur der Koniferentracheiden unter besonderer Berücksichtigung der Cupressaceae. **[Wart-like structures in conifer tracheids with particular reference to the Cupressaceae.]** *Ber. dtsch. bot. Ges.* 70 (1), 1957 (21–30). 18 refs. [G.g.] O.B.D.

Electron-microscope observations of 9 species of Cupressaceae show that as in the Pinaceae [see *F.A.* 16 No. 2148] numerous warty excrescences are found on the tertiary wall of cells and bordered pits. Their form and distribution are very variable; their diameter varied mostly between 25 and 500mμ; the maximum height recorded was $> 1\mu$. A comparison of diameter distribution for 300 such excrescences in *Widdringtonia dracomontana* and 3 Pinaceae showed very similar curves, but in *W. dracomontana* maximum diameters of almost 1000mμ were found, and on the evidence of the material examined, the maximum diameters for the Cupressaceae in general were higher than for the Pinaceae.

910. LIESE, W. Zur Struktur der Tertiärwand bei den Laubhölzern. **[The structure of the tertiary wall in hardwoods.]** *Naturwissenschaften* 44 (7), 1957 (240–1). [G.] O.R.S.

Warty excrescences were found on the tertiary wall of fibres and tracheids of a number of species. The number and size of the excrescences varied.

911. LIESE, W. Der Feinbau der Hoftüpfel im Holz der Koniferen. **[Fine structure of bordered pits in coniferous wood.]** *Repr.* from *Proceedings, International Conference on Electron Microscopy, London 1954*, 1956 (550–4 + 6 photos). 9 refs. [G.e.]

The part of the pit membrane which controls the filtration of liquids consists of loose fibril network. Experiments with replica technique and filtering tests showed that no further membrane exists between elementary fibrils, so that liquids can flow through open spaces from tracheid to tracheid. *From author's summary.*

912. BANNAN, M. W. **The structure and growth of the cambium.** *Tappi* 40 (4), 1957 (220–5). 16 refs. P.R.

A two-stage process is involved in the succession of cell divisions in the cambium; an initial cell in each radial file of elements gives rise to tissue mother cells on either side (xylem and phloem), which in turn divide to produce the wood and bast components. Increase of girth is achieved by semi-transverse multiplicative division of the cambial initials. These divisions occur relatively frequently with a consequent potential over-production of new cambial cells. In the resulting intracambial competition, the initials which are the longest and have the most extensive contacts with vascular rays survive to continue the cyclic process of growth and multiplication, whereas the less favoured cells fail. The cambium is thus in a state of flux with a ceaseless alteration in cell pattern and continual renewal of initials. *From author's summary.*

913. TAMOLANG, F. N. *et al.* **Fibre dimensions of certain Philippine broadleaved woods and Bamboos.** *Tappi* 40 (8), 1957 (671–6). 14 refs. P.R.

Fibre dimensions and distribution of fibre lengths are tabulated for 38 Philippine broadleaved species and 4 Bamboos.

811.2. Special Features and Abnormal Structure

See also Nos. 615, 978.

914. CONSTANTINESCU, A. Cercetări preliminare asupra formaţiunii de lemn de compresiune la bradul (*Abies alba*) din pădurea Chilerei-Valea Timişului. **[Preliminary investigations of the formation of compression wood in *A. alba* in Chilerei forest in the Timiş valley.]** *Industr. Lemn.* 5 (10), 1956 (455–7). [Rum.russ.g.]

A study was made of a Silver Fir growing on a sloping site (45° gradient) with a pronounced curve and excentricity in the butt. The factors investigated were: (1) proportion and orientation of zones of compression wood in transverse sections at different heights in the stem; (2) width of annual ring and proportion of late wood in compression-wood zones compared with normal wood; (3) microscopic structure of compression wood; (4) apparent sp. gr. and coefficients of total shrinkage in compression and normal wood.

915. DADSWELL, H. E., and WARDROP, A. B. **The importance of tension wood in timber utilization.** *Proc. Aust. Pulp Pap. Ind. tech. Ass.* 10, 1956 (30–42). 17 refs.

Reviews the detailed structure of tension-wood fibres, and emphasizes the lack of lignification in various layers of the cell walls, particularly in the innermost gelatinous or tertiary layer. Discusses various gradations of tension wood and draws attention to what is termed incipient tension wood, which shows an apparent lack of normal cell-wall lignification, combined with the same cell-wall organization as in normal wood. The relation of all types of tension wood to problems of utilization of wood and pulp has been referred to, special stress being laid on the occurrence of irrevocable collapse in tension and incipient tension wood and on the correlation between formation of tension wood and the development of minute compression failures in the tree. *From authors' summary.*

811.4. Growth Rings. Early and Late Wood

See Nos. 804–5, 808, 974.

916. SCHULTZE-DEWITZ, G. Einfluss der soziologischen Stellung auf den Jahrringbau sowie auf die Holzelemente bei Fichten und Tannen eines Naturwaldes. **[Influence of crown class on the annual-ring structure and on the wood elements in Spruce and Silver Fir in a natural forest.]** *Arch. Forstw.* 6 (1), 1957 (24–8). 2 refs. [G.g.]

Examination of increment cores from 3 Spruce and 2 Silver Fir, (*a*) dominant and (*b*) dominated (middle canopy) stems, showed that in (*a*) the annual-ring structure is irregular compared with the regular form of (*b*). The proportion of late wood (and with it the timber strength) increases as ring width decreases. Compared with (*b*), the (*a*) stems of both species show a definite tendency to lay down tracheids with wider lumina in the early wood. Crown

class does not influence late-wood tracheid diameter or wall thickness.

812. Physical and Mechanical Properties

917. JUKNA, A. D., and TYLTINSCH [TYLTINŠ], K. K. **[Physical and mechanical properties of the wood of *Alnus glutinosa* growing in the Latvian S.S.R.]** *Latvijās PSR Zinātņu Akademijas Vēstis, Riga* 1956 (3), (69–74). [Latv.?] From *abstr.* in *Holzforschung, Berlin* 11 (1), 1957 (23). [G.] P.R.

The properties of the wood from trees of site class II differ only slightly from those of site class III except in density, which is 0·52 g./c.c. for the former, but 4% higher for the latter. The compression strength ‖ is 400 ± 5 kg./sq. cm., while bending strength (static) is 710 ± 9·5 kg./sq. cm. No significant differences are found between wood from the upper and from the lower parts of the trees.

918. PREDESCU, G. Salcia căpreasca şi economisirea masei lemnoase. **[The importance of *Salix caprea* for economy in the use of wood.]** *Rev. Pădurilor* 1957 (6), (400–3). 13 refs. [Rum.]

Reviews Rumanian literature, and gives data comparing physical and mechanical properties of *S. caprea* with Spruce, Oak, Robinia and Poplar, and its tannin content with that of other Willows.

919. PALANDSHAN, W. A. [PALANDŽAN, V. A.] **[Some properties of the wood of *Celtis caucasica*.]** *Izv. Akad. Nauk armjansk. SSR* (*biol. sel.-hoz. Nauki*) 7 (6), 1955 (77–85). [Russ.?] From *abstr.* in *Holzforschung, Berlin* 11 (1), 1957 (24). [G.] P.R.

The following data were obtained for this wood at 15% moisture content: density 0·70; coefficient of radial shrinkage 0·18%, of tangential shrinkage 0·24%; maximum water uptake 115%; strength (in kg./sq. cm.)—compression ‖, 331; bending, 481; shear, (radial) 91, (tangential) 97; compression ⊥, (radial) 159, (tangential) 157; tensile ⊥ (radial) 53, (tangential) 35; end-grain strength [hardness? method not specified] 524; lateral strength [hardness?], (radial) 458, (tangential) 443. Compared with Oak and Scots Pine, *C. caucasica* has a higher hardness and shear strength, other coefficients being lower. It lends itself to the manufacture of large-size veneers.

920. Importância dos estudos de laboratório no desenvolvimento da indústria da madeira. **[The importance of laboratory studies in the development of the timber industry.]** *Brasil madeireiro* 12 (117), 1957 (3–6). [Port.]

Presents the results of tests made at the Instituto Nacional de Tecnologia on the strength and physical properties of sapwood and heartwood of *Eucalyptus citriodora.*

921. KITAMURA, H. **[Studies on the 'Kiri' (*Paulownia tomentosa* Steud.) wood. (5) On the quality of wood from the natural forest in Fukushima Prefecture—comparison of samples from Fukushima and Niigata Prefectures.]** *J. Jap. For. Soc.* 38 (10), 1956 (400–8). 3 refs. [Jap.jap.e.*e.*]

Results of comparative measurements on ring width, sp. gr., compressive strength, bending modulus of rupture and modulus of elasticity are shown in graphs and tables.

922. **[Comparisons of the strength and related properties of Kokonoe-kiri, and Nippon-kiri, grown in Japan.]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 97, 1957 (83–107 + 13 photos). [Jap.*e.*]

Includes photomicrographs (×10) of *Paulownia fortunei* and *P. tomentosa.*

923. **[Strength and related properties of Apitong.]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 97, 1957 (109–50 + 6 photos). [Jap.jap.*e.*]

Includes photomicrographs (×13) of resinous and very resinous timber of a *Dipterocarpus* sp.

924. **[Strength and related properties of Kowa (Kruin [Keruing, *Dipterocarpus* sp.]).]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 97, 1957 (151–62). [Jap.*e.*]

812.1. Optical, Acoustic, Frictional, Thermal and Electrical Properties

925. **Ignition of wood.** *Rep. Fire Res. Bd., Lond. 1956*, 1957 (9).

Records obtained during experimental determinations of the ignition temperature of wood have been used to estimate (*a*) rate of evolution of heat at given temperatures, and (*b*) activation energies for stages in the ignition process. For a number of different woods, in the form of sawdust, with a copious supply of air, the rate of heat evolution was of the order of 2·5–4 cal. min.$^{-1}$ g.$^{-1}$ at 250° C. and the activation energies were 23,000–33,000 cal./mol. A sample of Blackwood (*Dalbergia melanoxylon*) that had been involved in a fire was examined. The wood had an unusually high sp. gr.—about 1·4. Sawdust from the wood was able to sustain smouldering in still air, and the smouldering dust was able to ignite Blackwood shavings in contact with the dust. Its behaviour was thus similar to that of dust and shavings of commoner, lighter woods.

812.2. Behaviour with Liquids and Gases. Moisture Relations etc.

See also Nos. 914, 978.

926. CURRÒ, P. **Physical characteristics of the wood of *Populus* x *euramericana* (Dode) Guinier 'I 154' and of *Populus tremula* L.** [*Docum.*] *int. Poplar Comm., 5th Sess. Wkg. Party on Exploitation and Utilization, Paris 1957* No. *FAO/CIP/UT/2*, 1957. pp. 12 + 18 sets of dgms. & gphs. 2 refs. [E.] Limited distribution.

Compares (*a*) moisture content, (*b*) basic, and (*c*) oven-dry density, and (*d*) shrinkage values (volume, radial, axial and tangential) of wood from (1) 4 stems of *P.* × *canadensis* (cv. 'I. 154') aged 16, and 4 stems of *P. tremula*, in respect of variations due to position in the stem and season of felling. [For sampling methods cf. *F.A.* 17 No. 810.] For (1), (*a*) decreased progressively up the stem; for (2) it was lowest at ground level, but did not increase uniformly up the stem. Partial variations and variations with season of felling are also considered. In both (1) and (2), (*b*) and (*c*) increased radially from the centre of the stem towards the periphery. In (1) it

increased, in (2) decreased, up the stem. Similarly (*d*) tended to increase with height in (1) and to decrease in (2).

927. IVANOV, YU. [JU.] M. **Measurement of swelling pressure of wood.** *Comp. Wood.* 3 (5/6), 1956 (91–100). 6 refs. P.R.

Discusses the conditions of measurement of the swelling pressure p_s parallel to one direction (radial or tangential) when swelling deformation develops freely at right angles to this direction, and assumes that, for $p_s < \sigma_{pf}$ (the limit of plastic flow), the original structure of wood is not disturbed, and p_s should be the resultant of the internal pressures of the substances constituting the cell walls of the wood in this direction. Describes methods of determining the swelling pressure on small specimens [cf. *F.A.* 15 No. 4041] and shows that it can be measured with sufficient accuracy. The data obtained show that the restraint of swelling deformation in the direction of the measured pressure does not affect the degree of wood swelling. Results are given for Pine sapwood in water, 4% $Ca(NO_3)_2$ solution, and 30% ethanol (in water); also for early and late wood. The swelling pressure in the walls of early and late tracheids has been estimated at 100 kg./sq. cm. *From author's summary.*

928. KUMAR, V. B. **Swelling studies in wood. Part I.** *Norsk Skogind.* 11 (7), 1957 (259–68). 22 refs. [E.e.nor.] P.R.

A study was made of the influence of water and aliphatic alcohols (methyl, ethyl, propyl, butyl, and amyl alcohols) on the swelling of sapwood of *Musanga smithii*, *Betula verrucosa*, *Fagus sylvatica*, *Populus nigra* and *Pinus sylvestris*, with a density range of 0·15 to 0·70 g./c.c. Water-soaked specimens showed greater swelling than those impregnated with alcohol. For all liquids, swelling was proportional to the o.d. density of the wood, except with *M. smithii*, in which swelling was greater than would be expected from the density. Fibre-saturation coefficients were inversely proportional to o.d. density. Swelling was inversely proportional to the molecular weight of the impregnating liquid. Dimensions of the test pieces had some effect on swelling, but the results were erratic and inconclusive.

929. SHIM, C. S. **[A study on the effect of water-soluble extractives upon physical properties of wood.]** *Coll. Theseon (Sci. nat.) Univ. seoul.* No. 1, 1954 (117–62). 51 refs. [Kor.e.]

Samples of *Pinus strobus*, *Quercus rubra* and *Hymenaea courbaril* were soaked in water (*a*) or sugar solution (*b*), or left untreated (*c*), and examined for their physical properties. The following results were obtained: (1) Equilibrium moisture content was higher for (*b*) and (*c*) than for (*a*), and in sapwood than in heartwood of Pine. (2) Shrinkage was higher for (*a*) than for (*c*) except in Pine heartwood, and lowest for (*b*); shrinkage was highest in Oak and least in Pine, and lower in Pine heartwood than sapwood. Increasing amounts of extractives present increased the differences between (*a*) and (*c*). (3) Swelling was greater in (*a*) than in (*c*), highest for Oak and lowest for Pine heartwood. *From author's summary.*

930. PECK, E. C. **How wood shrinks and swells.** *For. Prod. J.* 7 (7), 1957 (235–44). 15 refs.

Discusses the mechanics of shrinking and swelling and the influence of wood structure, and tabulates data on shrinkage (radial, tangential, and volumetric) for ca. 130 American species dried to 20, 6, and 0% m.c.

931. KELSEY, K. E., and KINGSTON, R. S. T. **The effect of specimen shape on the shrinkage of wood.** *For. Prod. J.* 7 (7), 1957 (234–5).

A modification has been proposed in the standard test specimen for determining shrinkage of wood, so that shrinkage in the tangential, radial, and longitudinal directions can be determined on a single specimen [see *F.A.* 15 No. 2829]. In order to test the effect of the proposed change, tests were made on 32 species, and these showed that the effect of specimen shape (i.e. 4 in. long in parallel to the grain instead of to the direction of measurement) was significant only for tangential shrinkage after reconditioning, and then only at the 5% level.

932. PANA, G. I. *et al.* Cercetări asupra contragerii lemnului de molid, brad, pin, fag, stejar şi gorun. **[Studies on the shrinkage of wood of Norway Spruce, Silver Fir, Scots Pine, Beech, Pedunculate and Sessile Oak.]** *Industr. Lemn.* 4 (11), 1955 (433–7 + 16 dgms. & gphs.) 9 refs. [Rum. russ.]

The results of studies made at Bucharest.

933. STONE, J. E. **The effective capillary cross-sectional area of wood as a function of pH.** *Tappi* 40 (7), 1957 (539–41). 4 refs. P.R.

Results of electrical conductivity measurements on Aspen wood (*Populus tremuloides*) saturated with various buffers, have shown that the effective capillary cross-sectional area in the transverse direction remained substantially constant and well below that in the longitudinal direction, until a pH of 12·5 was reached. Only at pH 13·5 did it rise to 80% of that in the longitudinal direction. *From author's summary.*

812.3. Density. Specific Gravity. Buoyancy

See also Nos. 420–1, 455, 515–7, 914, 926, 974–6, 978.

934. RENDLE, B. J., and PHILLIPS, E. W. J. **The effect of rate of growth (ring width) on the density of softwoods.** Forestry Commission, London. 1957. pp. 8. 5 refs. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

The relation between rate of growth and density has been examined in fairly wide-ringed Douglas Fir and Corsican Pine grown in the south of England. A comparison between wood formed early in life and wood of similar ring-width formed later has shown that the latter is invariably denser, indicating that the higher density of the later wood is due to an age effect rather than to diminishing ring-width. It is concluded that, after a certain age, rapid growth can produce wood of a reasonably high density. This confirms that Turnbull's findings on widely spaced exotic softwoods grown in South Africa apply, with

reservations, to trees grown in Britain under conditions where rapid growth can be maintained. *From authors' summary.*

935. GÖHRE, K., and GÖTZE, H. Untersuchungen über die Rohwichte des Rotbuchenholzes. **[Investigations on the density of Beech timber.]** *Arch. Forstw.* 5 (9/10), 1956 (716–48). 13 refs. [G.g.]

An investigation similar to that on Douglas Fir [cf. *F.A.* 18 No. 905] augmented by statistical analysis of published data. Conclusions are that density does not vary with compass direction at the same level in the tree, and only in the lower stem is a decrease from pith to bark significant. Density decreases up the stem to 6 m., remains steady, and then increases towards the top [equation given]. It is chiefly influenced by the proportion of vessels in the rings. No definite causal relation could be established between age and density nor was any relation found between ring width and density. Site had no apparent effect on density, the range of densities for individual sites being wider than the difference for different sites.

812.7. Strength Properties

See also Nos. 455, 974–6, 1023, 1093, 1109, 1131, 1135.

936. HILTSCHER, R. **Photoelasticity in wood research—methods and proposals.** *Comp. Wood* 4 (1/2), 1957 (9–16). 15 refs. P.R.

Discusses photoelastic stress determination in plane stress fields (principles and equipment), and describes the application of photoelastic model tests in wood research (design of a test-piece by successive improvement of the shape, and photoelastic studies with laminated model material).

937. WOOD, L. W. **Effect of prestressing on mechanical properties of Douglas-Fir and Southern Yellow Pine.** *Rep. U.S. For. Prod. Lab., Madison* No. 2073, 1957. pp. 5 + 2 tbls., 2 gphs. 4 refs. P.R.

Test results show that while the reduction of strength from pre-stressing is generally small, the stress at the proportional limit varies widely and often shows a large reduction, indicating an increase of plasticity, which makes both proportional limit and modulus of elasticity hard to identify by the conventional methods.

938. DUPU, M. Date privitoare la elasticitatea lemnului cîtorva specii exotice cultivate în țara noastra. **[Some data on the elasticity of the wood of some exotic species grown in Rumania.]** *Rev. Pădurilor* 1956 (9), (601–4). 5 refs. [Rum.]

Gives values of modulus of elasticity (static bending, compression ||, tension ||, and torsion) for *Pseudotsuga taxifolia, Taxodium distichum, Juniperus virginiana, Carya ovata, C. glabra, C. laciniosa* and *C. pecan*, grown in Rumania.

939. SAWADA, M. **[Studies on the mechanics of wood beams (Report 4). Bending creep in wood under dead loading (1).]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 98, 1957 (85–116 + 13 photos). 6 refs. [Jap.jap.e.*e.*]

Tests were made on clear, air-dried beams of *Cryptomeria japonica, Picea jezoensis* and *Pinus densiflora*, for which data on mechanical properties are tabulated. From deflection readings taken hourly for the first 10 hours, and then, as the creep effect declined, at random intervals up to 300 hours, the relation of creep to the ratio applied-load/computed-maximum-load is studied in detail.

940. KNEŽEVIĆ, M. Uticaj ugla presecanja vlakanaca na čvrstoću pritiska i savijanja kod hrastovine. **[The influence of sloping grain on the compression strength and bending strength of Oak.]** *Šumarstvo* 9 (11/12), 1956 (667–87). [Serb.e.f.]

Studies were made on 4 Oak logs each of which was halved along the axis, giving two cants, *A* and *B*, of semicircular section. A centre board 35 mm. thick, cut parallel to the grain, was taken from each cant. From the remaining pieces boards were flat-sawn at angles giving various degrees of sloping grain (deviating 1–7% from parallel). Samples were taken for tests of compression strength ($2 \times 2 \times 4$ cm.) and bending strength ($2 \times 2 \times 32$ cm.). Samples from *A* were cut to show the same slope of grain as the boards; those from *B* were cut parallel to the grain. Graphs show the reduction in compression and bending strengths due to sloping grain. Attention is drawn to the decrease in strength of flat-sawn boards, as the arcs of the annual rings become steeper, towards the slab sides of the log: assortments for which strength is important should be sawn from the middle region, and wood may be saved by sawing thinner boards here and thicker ones towards the sides.

941. KOLENTSCHUK [KOLENČUK], K. I. **[The effect of longitudinal saw incisions on the load-bearing capacity of heartwood when subjected to pressure.]** *Dopovidi Akademii Nauk Ukrainskoj RSR* 1955 (241–4). [Ukr.?] From *abstr.* in *Holzforschung, Berlin* 11 (1), 1957 (24). [G.] P.R.

Saw incisions made in imitation of deep seasoning cracks caused a decrease of ca. 13% in [static bending?] strength, explained mainly by unavoidable cutting of fibres during sawing. This does not occur in cracks due to drying, which do not materially reduce the strength of the wood in this sense.

942. KLOOT, H. **Klinki Pine—a substitute for Spruce.** *For. Prod. Newslett. C.S.I.R.O. Aust.* No. 231, 1957 (3–4). 1 ref.

Compares strength/weight properties of the two woods, showing that *Araucaria klinkii* is a very good substitute for *Picea sitchensis* for glider timber.

943. KLOOT, H. **Can the strength of Radiata Pine be improved?** *For. Prod. Newslett. C.S.I.R.O. Aust.* No. 232, 1957 (1–2).

Presents data to show that some air-dried, defect-free timber of this species, taken from between the 20th and 40th annual rings, is stronger than average Douglas Fir and Mountain Ash, and stronger on density/strength basis than 5 other Eucalypt woods. The strength tends to fall off between the 30th and 35th year. To get such strength would involve high site quality, high pruning, and careful sawing.

944. OKAWARA, S. **On the boring-test of wooden bridge members for their durability judgment.** *Trans. 64th Mtg. Jap. For. Soc.* 1955 (289–91). [Jap.?] From *abstr.* in *Rec. Res. Fac. Agric. Univ. Tokyo* No. 6, 1957 (88). [E.]

Tests by boring [see *F.A.* 14 No. 2812] on samples from normal and decayed structural members of *Tsuga sieboldii*, air-dry or with m.c. above fibre saturation point, showed a linear relationship between boring energy and compressive strength. It is concluded that the method is suitable for use in the field.

813. Wood Chemistry

See also Nos. 69, 74.

945. SANDERMANN, W. Grundlagen der Chemie und chemischen Technologie des Holzes. [**Fundamentals of the chemistry and chemical technology of wood.**] Akademische Verlagsgesellschaft Geest & Portig K.-G., Leipzig. 1956. pp. xi + 498 + 4 photos. 1055 refs. [G.] P.R.

Contains sections on wood as chemical raw material; history and statistics; photosynthesis; anatomical structure of wood; chemistry of the wood constituents; chemical methods in the wood industry, and practical directions for preparation and analysis.

813.1. Chief Organic Constituents. Constituents of the Cell Wall

946. STEWART, C. M. **Status of cambial chemistry.** *Tappi* 40 (4), 1957 (244–56). 106 refs. P.R.

Covers the available information on production, translocation, and composition of nutrients utilized by the lateral meristematic tissues; effect of ambient conditions on cambium activity; effect of the rate of cell division in the cambium on the structure of the derivative cells; distribution of different materials 'extraneous' to the cell wall; variation of the cell-wall components during cell differentiation; chemical mechanism of lignin formation and lignin deposition. *From author's summary.*

947. PEARL, I. A. *et al.* **Alkaline hydrolysis of representative hardwoods.** *Tappi* 40 (5), 1957 (374–8). 9 refs. P.R.

Thirty-four representative hardwoods were extracted with boiling 1-*N* NaOH, and the alkaline extracts were analysed qualitatively by paper chromatography and quantitatively by paper chromatography and spectrophotometry. The following were determined quantitatively: vanillin, syringaldehyde, vanillic acid, syringic acid, *p*-hydroxybenzoic acid, ferulic acid, and *p*-coumaric acid. The presence or absence of one or more of these acids in certain genera, or in individual species within a genus, should prove useful for taxonomic purposes. All species in *Populus* and *Salix* contained *p*-hydroxybenzoic acid, but these were the only two genera in which it was found. All species tested yielded vanillin, syringaldehyde, vanillic acid and syringic acid, but the other compounds were much more specific. Possible taxonomic applications of the procedure are discussed. *From authors' summary.*

948. SCREATON, R. M., and MASON, S. G. **Sorption of alkali on Spruce lignin, holocellulose and wood.** *Svensk PappTidn.* 60 (10), 1957 (379–87). 33 refs. [E.e.sw.g.] O.R.S.

949. MATER, J. **Chemical effects of high energy irradiation of wood.** *For. Prod. J.* 7 (6), 1957 (208–9). 8 refs.

Reviews studies with X-, gamma- and beta-ray irradiation on cellulose, dextran, lignin, and Douglas Fir sawdust. The last named (unpublished) study, by L. M. F. Remmert and J. S. Butts, revealed that the cellulose of this sawdust can be made available to rumen organisms, and thus to their hosts, by irradiation.

950. MEREWETHER, J. W. T. **A lignin-carbohydrate complex in wood.** *Holzforschung, Berlin* 11 (3), 1957 (65–80). 156 refs. [E.e.g.]

A critical review discussing the problem of a chemical linkage between lignin and carbohydrate in lignified cellulosic materials. A thorough examination of the pertinent literature led to the view that many phenomena may be explained by the incrustation theory, but other phenomena might only be explained by the presence of definite complexes of lignin and carbohydrate in chemical combination. *From author's summary.*

951. PEW, J. C. **Properties of powdered wood and isolation of lignin by cellu[lo]lytic enzymes.** *Tappi* 40 (7), 1957 (553–8). 10 refs. P.R.

Spruce and Aspen wood were ground in a specially designed vibratory ball mill for 5 hours, and the powdered wood was subjected to the action of enzymes. It was entirely soluble in 2*N* NaOH, in strong aqueous solutions of NaCNS, and in formic acid, and partially soluble in many organic solvents. Cellulases readily digested ca. 95% of its carbohydrate, leaving a lignin residue with 12–14% of carbohydrates which, on acid hydrolysis, gave all 5 sugars present in the original wood. No method was found to remove the bulk of the residual carbohydrate without simultaneously removing part of the lignin. The solubility of this crude lignin in various solvents is given. *From author's summary.*

952. BJÖRKMAN, A. **Studies on finely divided wood. Part 5. The effect of milling.** *Svensk Papp-Tidn.* 60 (9), 1957 (329–35). 36 refs. [E.e.sw.g.] P.R. [Cf. *F.A.* 18 Nos. 4574–5.]

953. ADLER, E. **Newer views of lignin formation.** *Tappi* 40 (4), 1957 (294–301). P.R.

Present views on the biogenesis of lignin are summarized. By using radioactive tracers, the pathway of conversion of glucose into phenylpropane intermediates in lignifying tissues has been greatly elucidated. Studies on the role of such intermediates in the biosynthesis of lignin indicate that substituted cinnamic alcohols, viz. coniferyl, sinapic and *p*-cumaric alcohols, are subjected to dehydrogenative polymerization yielding the protolignins. The relationship between the structures of the dimeric intermediates obtained by Freudenberg and co-workers on enzymatic oxidation of coniferyl alcohol and recent views on lignin structure as derived from analytical work is briefly discussed. *From author's summary.*

954. KREMERS, R. E. **The occurrence of lignin precursors.** *Tappi* 40 (4), 1957 (262–8). 16 refs. P.R.

Reviews the existing data on the occurrence in plants of some compounds that have been thought to be precursors of lignin (coniferin, syringin and some related compounds).

955. KRATZL, K., and BILLEK, G. **Synthesis and testing of lignin precursors.** *Tappi* 40 (4), 1957 (269–85). 62 refs. P.R.

Summarizes the essential reactions of lignin, discusses the importance of Freudenberg's dehydrogenation polymers in the problem of lignin biogenesis, and examines substances other than coniferyl alcohol. Describes in detail the syntheses of labelled cambial-sap glucosides and examines their transformations in lignifying tissues. Deals also with the quantitative evaluation of ethanolysis of labelled implants, and the occurrence of a polymer coniferyl aldehyde structure.

956. ISHIKAWA, H., and TAKAICHI, K. **[Lignin and lignification (6). The formation of lignin in the young plants (2).]** *J. Jap. For. Soc.* 39 (2), 1957 (70–3). 18 refs. [Jap.jap.e.*e.*]

Light, colour of light, concentration of CO_2 and peroxidase activity are established as limiting factors in lignin biosynthesis, the mechanism of which is found to be related to that of the biosynthesis of shikimic acid and certain aromatic amino-acids. Data are given for *Pinus densiflora.* [Cf. *F.A.* 15 No. 1771.]

957. NORD, F. F., and SCHUBERT, W. J. **On the mechanism of lignification.** *Tappi* 40 (4), 1957 (285–94). 34 refs. P.R.

The native lignins of Scots Pine, Oak, Birch, Maple and bagasse were found by chemical and physical examination to be identical with the lignins liberated from these species by the enzymatic action of wood-destroying fungi. *Lentinus lepideus* is known to produce methyl-*p*-methoxycinnamate as a terminal product when grown on carbohydrates or ethanol as sole C source. Among the intermediary metabolites of this culture, substances were identified which point to a relationship between the biogenesis of methyl-*p*-methoxycinnamate and of certain aromatic amino-acids. The results of relevant experiments on the incorporation of shikimic acid into a living sugar-cane plant showed that the cyclohexene ring of this acid is converted directly into the aromatic ring systems of lignin without randomization of the C atoms. *From authors' summary.*

958. WARDROP, A. B. **The phase of lignification in the differentiation of wood fibers.** *Tappi* 40 (4), 1957 (225–43). 81 refs. P.R.

Discusses the physical texture and submicroscopic organization of the cell wall in wood fibres. It is shown that lignin is present mainly between the cellulose microfibrils, but to some degree may penetrate within them. Evidence that lignin is concentrated mainly in the region of the middle lamella and primary wall is reviewed. A description is given of the sequence of changes in the differentiation of wood fibres. Lignification begins in the middle lamella and secondary walls. The modification of the normal progress of lignification brought about by treatments such as partial and complete ring-barking during the induction of reaction-wood formation is also dealt with. In all cases the observed complementary distribution of peroxidase and lignin deposition supports the view that at least one peroxidase-controlled phase of lignification proceeds within the cell wall. Theories on the origin of lignin precursors are reviewed.

959. TRAYNARD, P., and BARNOUD, F. Biosynthèse de la lignine. Contribution apportée par la méthode de la culture des tissus végétaux *in vitro.* **[Biosynthesis of lignin. Information obtained by the method of cultivating plant tissues *in vitro.*]** *Holzforschung, Berlin* 11 (3), 1957 (85–90). 17 refs. [F.f.g.] P.R.

Gives results from studies of the nature of substances formed by cambial tissue cultures of *Syringa* sp. and *Rosa* spp., with special reference to glucosides as precursors of lignin, and to a polyose complex having a high pentosan content extracted from wood by the hydrolysing effect of water at a high temperature.

960. TIMELL, T. E. **Carbohydrate composition of ten North American species of wood.** *Tappi* 40 (7), 1957 (568–72). 32 refs. P.R.

The carbohydrate portion of ten species [cf. *F.A.* 18 No. 3326] has been quantitatively determined in terms of the monosaccharide units.

961. PARISOT, A., and CHAMPETIER, G. 'Points sensibles' dans la chaîne moléculaire de la cellulose des fibres naturelles. **[Weak points in the molecular chain of the cellulose of natural fibres.]** *Chim. et Industr.* 77 (6), 1957 (1317–24). 24 refs. (F.f.span.e.] D.S.I.R.

New information has been obtained from recent studies of the mechanical properties of natural cellulose (both dry and wet) in terms of the degree of polymerization of the pure cellulose: if weak points really exist, they ought to imply greater accessibility to water and chemicals. No final conclusion on the nature of the weak points can be yet made on the basis of paper chromatographic tests of fibre hydrolysates. *From authors' summary.*

962. STEWART, C. M., MCPHERSON, J. A., and FRYDMAN, L. **Chemistry of the wood substance of *Eucalyptus regnans* F. Muell. as revealed by hydrolysis experiments.** *Proc. Aust. Pulp Pap. Ind. tech. Ass.* 10, 1956 (298–345). 48 refs.

Acid hydrolysis tests on precipitates from concentrated short-time methanol extracts of *Eucalyptus regnans* heartwood (outer rings) show that there is a relationship between the ease of solubility of polysaccharides and either their uronic-acid content or their ratios of pentose to uronic-acid units. The results suggested that the non-resistant, the resistant non-cellulosic, and the cellulosic, polysaccharides *in situ* contain pentose and uronic acid units in ratios of ca. 2·5, 7·5, and 14 to 1, respectively. *From authors' summary.*

963. MACHIDA, S., INANO, M., and MATSUMURA, Y. **Chemical studies on wood hemicelluloses. I. On the hemicellulose of *Fagus crenata* wood.** *Repr.* from *Bulletin, Chemical Society of Japan, Tokyo* 30 (3), 1957 (201–2). 9 refs. [E.e.] P.R.

A suitable paper-chromatographic method, using circular chromatograms, has been developed for analysing wood hemicelluloses. This method has been used for studying the behaviour of hemicellulose in *F. crenata* during chemical pulping processes.

964. JONES, J. K. N., MERLER, E., and WISE, L. E. **The hemicelluloses present in Aspen wood (*Populus tremuloides*). Part III. The constitution of pentosan and hexosan fractions.** *Canad. J. Chem.* 35 (7), 1957 (634–45). 14 refs. O.R.S. [Cf. *F.A.* 14 No. 1528.]

965. TIMELL, T. E., and TYMINSKI, A. **The structure of a glucomannan from White Spruce. I. Isolation and general properties.** *Tappi* 40 (7), 1957 (519–22). 22 refs. P.R.

Describes the isolation of a polysaccharide containing only glucose and mannose residues (in the 1/3 ratio which remained unchanged during purification). It is suggested that the hemicellulose product is a heteropolymer glucomannan.

813.2. Minor Organic Constituents. Extractives. Cell Contents

See also Nos. 929, 977, 1136.

966. BARTON, G. M., and GARDNER, J. A. F. **A comparison of the heartwood extractives of *Picea glauca* and *Picea engelmannii*.** *For. Chron.* 33 (2), 1957 (136–8). 4 refs.

No consistent significant differences were found between extracts prepared from heartwood of the two species, and the likelihood of finding a simple chemical method of distinguishing the two species is small.

967. RENNERFELT, E. **The natural resistance to decay of certain conifers.** *Friesia, København* 5 (3/5), 1956 (361–5). 5 refs. [E.e.] I.M.I.

Experiments were made on 20 coniferous species by the Leutritz soil method and results are tabulated. The heartwood of some species was shown to contain fungistatic substances, of others to contain water-repellent oils, and of yet others a combination of fungistatic substances and water-repellent oils. *From author's summary.*

968. KEPPLER, H. H. **The isolation and constitution of mollisacacidin, a new *leuco*-anthocyanidin from the heartwood of *Acacia mollissima* Willd.** *J. chem. Soc.* June, 1957 (2721–4). 11 refs. O.R.S.

969. MONGOLSUK, S., ROBERTSON, A., and TOWERS, R. **2 : 4 : 3′ : 5′-Tetrahydroxystilbene from [powdered wood of] *Artocarpus lakoocha*.** *J. chem. Soc.* May, 1957 (2231–3). 3 refs. O.R.S.

970. HASEGAWA, M. **Flavonoids of various *Prunus* species. VI. The flavonoids in the wood of *Prunus aequinoctalis*, *P. nipponica*, *P. maximowczii* and *P. avium*.** *J. Amer. chem. Soc.* 79 (7), 1957 (1738–40). 9 refs. O.R.S.

971. GUPTA, V. N., and SESHADRI, T. R. **Special chemical components of commercial woods and related plant materials: Part V—*Zanthoxylum rhetsa*.** *J. sci. industr. Res., India* 16*C* (3), 1957 (71–2). 7 refs. P.R.

Coumarin derivates and alkaloids are known to be major components of the bark, leaves, roots, fruits and seeds of this genus. The note gives the results of an analysis (extraction and fractionation) of substances obtained from a log (heartwood, sapwood and bark) of *Z. rhetsa.*

813.3. Ash Constituents

972. MILANEZ, F. R., and FILHO, A. MATTOS. Nota sôbre a occorrência de sílica no lenho de leguminosas. **[The occurrence of silica in the wood of Leguminosae.]** *Repr.* from *Rodriguésia* 18/19 (30/31), 1956 (7–16 + 9 plates). 12 refs. [Port. port.e.] X.

Irregularly shaped concretions of silica, ca. 12–15μ in diam., were found in the secondary wood of *Dialium guianense* and *Dicorynia* spp. In *D. guianense* they occur in the parenchyma, where they may exist along with oxalate crystals. In the species of *Dicorynia* examined, silica was found in the parenchyma and in the rays. The occurrence of silica in these woods may cause them to be immune to Teredo attack. *From authors' summary.*

814. Natural Durability. Old Wood. Fossilized Wood

See also Nos. 420, 967, 1092, 1106.

973. APPLEQUIST, M. B. **Service tests of native Louisiana fence post materials.** *L.S.U. For. Note La. agric. Exp. Sta.* No. 12, 1957. pp. 2. 1 ref.

On the basis of tests on 1056 posts, classifies the local species as durable (estimated service life $\geqslant$ 10 years), moderately durable (5–10 years) and non-durable. [Cf. *F.A.* 15 No. 706.]

815. Effect of Growth Factors on Structure and Properties

See also Nos. 420–1, 455–6, 808, 914–7, 926, 934–5, 943, 1092, 1143.

974. KLAUDITZ, W., and STOLLEY, I. Untersuchungen über das Holz von Douglasien verschiedener Standorte in Niedersachsen. **[Investigations on the properties of Douglas Fir wood from various sites in Lower Saxony.]** *Aus dem Walde, Hannover* No. 1, 1957 (51–73 + 18 photos, 4 gphs.). 17 refs. [G.g.]

Presents data on ring widths, early and late wood %s, density and strength properties (both for the wood as a whole and for early and late wood separately) based on tests of 9 stems (mostly 60–75 years old and 42–62 cm. in d.b.h.) from widely different sites. All characters showed wide variation; in one instance the tensile strength of early and late wood was respectively 400 and 2300 kg./sq. cm. At oven-dry densities (of the whole wood) $>$ 0·55 g./c.c., inhomogeneity of the wood tended to affect working and strength properties adversely. No clear correlation was found between site conditions

and wood properties, except that the stems with the highest density were from sites with the lowest rainfall.

975. PAUL, B. H. **Second growth is good.** *Rep. U.S. For. Prod. Lab., Madison* No. 2083, 1957. pp. 6 + 5 photos, 1 gph. P.R. Also in *Sth. Lumberm.* 195 (2432), 1957 (29–30).

Summarizes the results of research on the properties of second-growth timber, including tabulated data on diam. growth, sp. gr. and hardness for old and second growth timber of 6 common U.S. hardwoods and 5 conifers.

976. BANKS C. H. **A comparison of the strength of timber from the major and minor radius of eccentric trees.** Government Printer, Pretoria. 1957. pp. 10. 8 refs. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

In *Pinus montezumae*, sp. gr. 0·35 to 0·60, wood from the major radius proved similar in strength to that of the minor radius, except that in hardness and side compression it was stronger and in toughness and modulus of elasticity weaker than minor-radius wood of the same density. It is, however, generally denser than the minor-radius wood and where the difference in density is highly significant, most strength properties are significantly different.

977. RAUNECKER, H. Beobachtungen über den Drehwuchs der Kiefer. **[Observations on spiral growth in Pine.]** *Holz-Zbl.* 83 (100), 1957 (1221). 8 refs. [G.]

Suggests a connexion between spiral growth and high starch content of the wood, both frequently found in stands near Müdesheim, Lower Franconia, and shortage of P in the soil. This would retard the formation of supporting tissue, particularly reaction wood, and thus lead to spiral growth.

978. WAHLGREN, H. E. **Effect of tension wood in a leaning Eastern Cottonwood.** *For. Prod. J.* 7 (6),1957 (214–9). 13 refs.

An analysis of samples from various parts of a stem with a 13% lean, showing lowest mean sp. gr. (*a*) (increasing with height in tree) and highest longitudinal shrinkage values (*b*) (decreasing with height) on the upper, tension-wood side of the tree. A significant correlation was found between (*b*) and the frequency of gelatinous fibres (*c*), but not between (*a*) and either (*b*) or (*c*).

82. Conversion, Shaping, Assembly and Finishing of Wood: General

979. Fortschrittliche Aspekte der Holzbearbeitungsmaschinenschau. **[Progressive trends at the exhibition of woodworking machines [Hanover Industries Fair 1957].]** *Holz-Zbl.* 83 (69), 1957 (879 . . . 894). [G.]

A retrospect, supplementary to previous accounts [see *F.A.* 18 No. 4596] including saws, drills, chippers, gluing, pressing and drying equipment etc., a stationary producer-gas installation using green sawdust, and novel auxiliaries, e.g. nylon hinges and a very light plastic core for blockboards, doors etc.

821. Barking

See Nos. 478–81, 1015.

822. Saws and Sawing

See also Nos. 1019, 1022.

980. Moderne deutsche Maschinen auf der Holzmesse 1957. **[Modern German woodworking machines in the 1957 [Klagenfurt] Timber Fair.]** *Int. Holzmarkt* 1957 (15), 1957 (24–7). [G.]

Briefly describes fully automatic saw-sharpening machines for frame-saw blades, the TSA saw-setting machine working by touch to tolerance limits of 0·01 mm., and various machine saws for different purposes.

981. CHARDIN, A. **The stellite-facing of band saw blades.** *For. Equipm. Note FAO* No. *D*.15.57, 1957. pp. 8. Translation of *Bois For. Trop.* No. 50, 1956 (49–56). [See *F.A.* 18 No. 2131.]

982. ISAKA, S. **[Distortion of wood. The method of sawing logs to secure diminution of shrinkage and warping.]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 97, 1957 (73–82). 2 refs. [Jap.e.*e.*]

A diagram is shown for flat-sawing a log for the minimum shrinkage and distortion, derived from equations based on measurements of boards dried slowly, without external pressure or undue case-hardening. The equations cover warping curves [see *F.A.* 16 No. 3553], radius of curvature (*P*) at a given point, ellipses traced by equal *P*, the relation between *P*, board width (*B*) and warping deflection (*e*). The distance from log centre to cutting line (i.e. radius of boxed heart) is

$$0{\cdot}081\,\frac{B^2}{e}\,(a_t - a_r);$$

$$\text{width of board } b = \frac{B + D\,(a_t - a_r) + 0{\cdot}2}{1 - a_t};$$

$$\text{and thickness } d = \frac{D + e + 0{\cdot}2}{1 - a_t};$$

here a_t and a_r are respectively the tangential and radial shrinkage, *B* and *D* the finished size in cm., with 0·2 cm. as the planing allowance.

983. **Log saw catalogue.** FAO, Rome. 1957. pp. xv + 439. [E.F.Span.] Price $4·00 or 20*s*.

Gives name and address of manufacturers, specification, power and labour requirements, output, and price. The catalogue is divided into sections on circular, vertical band, horizontal band, frame (gang) and single-blade reciprocating saws.

984. BEL'KEVIČ, E. M. Prisposoblenie dlja raspilivanija korotkih krjažej na lesopil'noj rame. **[A device for ripsawing short logs with a frame saw.]** *Derev. Prom.* 5 (4), 1956 (20). [Russ.] P.R.

Having only one point of support, short logs begin to oscillate when the saws are near the end of the log. This drawback can be eliminated by fitting additional feed rollers, which involves considerable expense. A simple appliance (described and illustrated) can be used instead, consisting of a steel plate 6 cm. wide and 1·5 cm. thick, to

which two supports resting on the axles of the bottom feed rollers are welded. Since the plate fills the gap between the rollers, the log does not oscillate.

985. SAITO, Y., EDAMATSU, N., and OHIRA, Y. **[1. Saw-dust properties affecting saw teeth cutting. 2. Formation of sawed surface with saw teeth.]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 97, 1957 (1–32). 32 refs. [Jap.jap.e.*e*.]

(1) Properties of sawdust are analysed under: method of estimating volume and weight of sawdust, the effects of m.c. and particle size on its volume, its pressure/volume relationships and the relation of depth of cut to sawing rate in reference to particle size and sawdust volume. The influence of grain direction on the length and breadth of the chip in ripping and cross-cutting and the influence of sawing conditions on sawdust properties in bandsawing were also studied. (2) A study of the effect of grain direction, and the kind, dimensions and precision of set of bandsaws on the quality of the sawn surface, carried out with projection apparatus and an examination of the profile of the sawn surface.

986. BERŠADSKIJ, A. L., and GUSEV, K. F. O povyšenii proizvoditel'nosti kruglopil'nyh stankov dlja prodol'nogo raspilivanija. **[Increasing the output of circular saws used for ripsawing.]** *Derev. Prom.* 5 (9), 1956 (6–8). [Russ.] P.R.

The authors prove the advantage of using circular saws in which the speed can be controlled. Starting from the theory of cutting, it is shown theoretically that an increase of output of 150–250% is attainable when the saw speed is increased from the present maximum of 50 m./sec. to 120 m./sec. It is claimed that the quality of the cut obtained at these high speeds is satisfactory.

987. COMES, I. C. Comportarea pînzelor de ferăstrău circular cu număr redus de dinţi şi cu profil ameliorat la tăierea longitudinală a lemnului. **[The behaviour of circular-saw blades with a reduced number of teeth and improved profile in ripsawing wood.]** *Industr. Lemn.* 6 (4; 5), 1957 (130-4; 170–4). [Rum. russ.g.f.e.]

Preliminary report on trials at the Rumanian forest products research station with three experimental blades having 12, 10, and 6 teeth respectively, spaced in different ways, compared with 56 in the standard blade. Results indicate that use of the experimental blades reduces power consumption by 50% and has other advantages, e.g. reduction of vibration and prevention of kick-back. Experiments continue.

988. SAITO, Y., EDAMATSU, N., and OHIRA, Y. **[Wood cutting test with mechanical saw teeth.]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 97, 1957 (33–60). 34 refs. [Jap.jap.e.*e*.]

An investigation of the effects of tooth angles, set, and m.c. of timber on power requirement, and of bite on cutting force and power and on the blunting of the tooth in sawing Oak, Pine, and Cryptomeria with a spring-set circular saw, with observations on sawing efficiency and quality of the sawn surface, particle-size distribution of sawdust etc.

989. DOWER, E. J., and OAKEY, W. E. **Selection of carbide-tipped saw blades for optimum performance.** *Pap. Amer. Soc. mech. Engrs.* No. 57-*WDI*-9, 1957. pp. 6. 2 refs. P.R.

Results of tests are presented in tables and graphs, showing that, in sawing with carbide-tipped blades, the bite per tooth bears a definite relationship to the energy required for sawing and the sawn finish.

990. **Mobile saw-sharpening unit.** *For. Equipm. Note, FAO* No. *D*.17.57, 1957. pp. 2.

Describes a mobile unit, constructed at the Centre Technique du Bois, Paris, for sharpening bandsaws.

991. EDAMATSU, N., and OHIRA, Y. **[Studies on setting methods of band saw tooth (Report 3). On the side-dressing of the swage-set tooth.]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 93, 1957 (51–68). 7 refs. [Jap.e.*e*.]

Examines theoretical and actual relations between die dimensions of the side dresser and swage set; swage-setting procedure and precision of set; and the effect of swage-set shape (side clearance angle) on power requirement and blunting in ripsawing (with a circular saw) of *Cryptomeria japonica*, *Pinus densiflora*, *Fagus crenata*, and *Machilus thunbergii*; and gives the dimensions of 22 saws used in a national sawing contest.

992. FONKIN, V. F. Profilirovka zub'ev ramnyh pil s pljuščenymi veršinami. **[The profile shaping of frame-saw teeth with swage-set tips.]** *Derev. Prom.* 5 (5), 1956 (13–7). [Russ.] P.R.

Sawmill experience has borne out the Soviet standard recommendation that the pitch of swage-set saw-teeth should be increased to 64 mm., with alteration of the height/pitch ratio. If the tooth pitch of frame-saws is chosen in accordance with the feed rate per stroke, it is possible to use a higher feed rate with reduced consumption of energy. The greatest effect of increasing the tooth pitch is obtained with logs of large diameter, where the difference between the calculated pitch (e.g. 32 mm. for depth of cutting of 330 mm., or 64 mm. for 640 mm.) and the conventional value of 22 mm. is the greatest.

993. LYANGUZOV [LJANGUZOV], A. V. **High-frequency treatment of swage-set teeth of frame saws.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 3316*A*, 1957. pp. 1. Transl. by M. Slade from *Derev. Prom.* 4 (12), 1955 (16–7). [See *F.A.* 18 No. 956.] Limited distribution. P.R.

994. BIRYUKOV [BIRJUKOV], V. A., and CHERNYSHEV [ČERNYŠEV], A. I. **Heat treatment of cutting tools with high-frequency current.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 3316, 1956. pp. 7 + 6 photos., 1 dgm., 1 tbl. Transl. by M. Slade from *Derev. lesohim. Prom.* 3 (2), 1954 (3–6). [Cf. *F.A.* 16 No. 3422.] Limited distribution. P.R.

823. Planing, Cutting of Mouldings. Chiselling, Mortising and Tenoning. Boring. Turning

995. FRANZ, N. C. **An analysis of the wood-cutting process.** *Abstr. of thesis*, in *Dissert. Abstr.* 17 (6), 1957 (1278–9). O.R.S.

In cutting parallel to the grain, 3 basic types of chip formation, each with characteristic failure in the wood ahead of the cutting tool were found. The main factors influencing the type of chip formation included interrelationships between mechanical properties of the wood, cutting angle, chip thickness, and friction between the chip and the tool.

996. BERŠADSKIJ, A. L. Analiz i rasčet režimov rezanija drevesiny. **[Analysis and calculation of wood-cutting schedules.]** *Derev. Prom.* 5 (5), 1956 (6–10). 2 refs. [Russ.] P.R.

Despite the lack of a general scientific theory of wood-cutting, it is possible to establish fundamental relationships between the various factors influencing the cutting process. The author analyses, for the process of moulding, the formula found by Time in 1868 and confirmed by Zvorykin in 1892: $K_e = K'/e^m$ where K_e and K' are the values of the specific work of cutting for chip thicknesses of e and 1 mm., respectively, and m is a power index < 1. Logarithms of the two sides of the equation yield a linear relationship between log K_e and log e, while log K' is the intercept. The author gives the relationship between K and the cutting angle δ as $K_\delta = K_{\delta=1^\circ}\,\delta^n$, where n is a constant. This equation also assumes a linear form when the logarithms are taken of its two sides. The relationship between K and the dynamic angle of incidence ψ is: $K'_\psi = K'_{||} + (K'_\perp - K'_{||})\sin^{1.25}\psi$. This equation can be presented in linear form if the variables are K'_ψ and $\sin\psi$.

Finally the dependence of K on v (the cutting speed) gives, in the v range 1–100 m./sec., a smooth curve with a maximum at $v \simeq 20$ m./sec. and a minimum at $v \simeq 45$ m./sec. The general equation based on experimental results is

$$K = \alpha_v K'_{\delta,\psi}/e^m$$

where α_v is the coefficient showing the dependence of K on v, and $K'_{\delta,\psi}$ is the specific work of cutting for a chip thickness of 1 mm., the cutting angle and incidence angle being δ and ψ respectively. Tables are given for α_v and m, while $K'_{\delta,\psi}$ is obtained from nomograms (for Scots Pine and for Oak). By suitable substitutions the following final equations are obtained for the power of cutting, N, and mean cutting force, P:

$N = \alpha_v K' bhz^m n^m U^{1-m}/6 \times 10^{3(1+m)}\sin^m\theta$ and

$P = 10^{3(1-m)} K' bhz^m U^{1-m}/\pi D n^{1-m}\sin^m\theta$ where

b is the width of cutting (e.g. kerf, chip width), h is the thickness of material, z is the number of teeth round the spindle, n is the number of rev./min. of the tool spindle, U is the feed rate, and θ is the kinematic angle of incidence ($\sin\theta \approx \sqrt{h/D}$, where D is the diameter of the circle of cutting). These equations are used for solving 4 numerical examples.

997. WALKER, K. J. S. **Cutting speed and cutting forces: some research at the Forest Products Research Laboratory.** *Wood* 22 (9), 1957 (371–3). 2 refs.

Study of the separating, frictional, normal, and chip-deforming and chip-moving forces of the curved paths of commercial cutters is complicated by continuously varying grain orientation and chip thickness. Automatic recording apparatus is described which removed both difficulties. Curves are plotted of the forces required, parallel to and normal to the cutting direction, for Beech and Sycamore Maple, cut 0·25 in. wide, 0·005 in. deep, at cutting angles of 30° and 15° and speeds up to 7000 ft./min. It is commonly believed that high-speed cutting is 'sweeter' but no theory has been framed to explain why forces should be greater (as is here clearly shown) at low speeds.

998. KRJAŽEV, N. A. Frezerovanie drevesiny koničeskimi frezami. **[Wood moulding with conical cutterheads.]** *Derev. Prom.* 5 (9), 1956 (3–5). 3 refs. [Russ.] P.R.

Demonstrates theoretically and experimentally the feasibility of increasing the feed rate and obtaining at the same time a smooth cut surface, by using cutterheads in the form of very shallow cones. It is calculated that a feed of 100 m./sec. should be possible at a spindle speed of 3000 rev./min. without causing any appreciable waviness. The necessary conditions are rigidity of the spindle and elimination of all vibrations.

999. NAKAMURA, G., and AOYAMA, T. **[On the statical cutting force of wood.]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 93, 1957 (69–88). 6 refs. [Jap.jap.e.*e.*]

A detailed examination of the horizontal and vertical cutting forces and the torque in the cutter head (recorded automatically with electric meters) used in planing the radial and end surfaces of 9 softwoods and 16 hardwoods, with many graphs and some oscillographs showing the effect and interrelations of cutting angle, thickness of shaving, and specific gravity of timber on the cutting force. [Cf. *F.A.* 13 No. 1546.]

824. Forms of Joint. Jointing and Assembly

824.1. Nailed Joints

1000. STERN, E. G. **Holding power of large nails and spikes in dry Southern Pine.** *Bull. Wood Res. Lab. Va. polyt. Inst.* No. 30, 1957. pp. 11. P.R.

Threaded nails and spikes proved, immediately after driving, to be 2¼ times as effective as the same size of plain-shank fasteners. A formula is presented for calculating the holding power of threaded stronghold nails and spikes in dry pre-drilled Southern Pine.

824.8. Glues and Gluing

See also Nos. 1034, 1051.

1001. HORIOKA, K., and NOGUCHI, M. **[Studies on plywood. (Report No. 7.) On the formaldehyde gas emitted at curing and using of plywood glued with urea-formaldehyde resin adhesive.]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 98, 1957 (117–26). [Jap.e.*e.*]

Gives data on amounts emitted (which render plywood unfit for some purposes) and recommends, for reducing them, the use of a low molecular ratio of formaldehyde, chemicals to combine with the free formaldehyde, and a protein extender.

1002. NEUSSER, H. Versuche mit Leimstreckmitteln für Harnstoffharze. **[Experiments with extenders for urea-resin glues.]** *Holz Roh- u. Werkstoff* 14 (12), 1956 (475–82). 16 refs. [G.g.] P.R.

Describes the fundamentals of torsional viscosimetry and discusses the differences between the fluidity of urea resins and that of aqueous solutions of flour. There are marked differences in the properties and behaviour of different kinds of flour or meal when blended with glues. The main property of an extender is its capacity to absorb water; this depends not only on the botanical identity of the raw material and the pre-treatment, but also on the properties of the glue mass to which the extender is added.

1003. BOOTH, C. C., and MAXWELL, J. W. **How long will it last? A study of glue line durability.** *For. Prod. J.* 7 (6), 1957 (187–95).

Describes exposure tests lasting 11 years, in the open and in a shed, and high-temperature/moderate-humidity accelerated tests, lasting 1 year, of various synthetic resin glues on various woods. Results showed that phenol- and resorcinol-formaldehyde resins were clearly superior, under severe service conditions, to urea-formaldehyde resins. The accelerated test gave satisfactory prediction of durability.

1004. RICE, J. T. **Effect of angular loading on glue line strength.** *For. Prod. J.* 7 (6), 1957 (196–9). 6 refs.

Resorcinol-formaldehyde glue-lines in laminated American Beech were tested under loading applied at various angles to the glue-line. In tension, both the shear component || to the glue-line and the normal component of the force applied at an angle, contributed to the failure, which occurred when their vector sums equalled ca. 1400 lb./sq. in. of glue-line. At angles for which compression shear testing was possible (up to 50°), only the shear component contributed to the failure, the normal component aiding in resisting shear. The shear strength of the glue-line in compression was over twice that in tension, and the % of wood failures was correspondingly higher. Low coefficients of variation in the compression tests with the load applied at 30°–40° suggests the need for further study of such tests as alternatives to the standard glued-block shear test.

1005. **Tooth-planing not necessary to produce strong glued wood joints.** *Tech. Note U.S. For. Prod. Lab., Madison* No. 227 (rev.) 1957. pp. 3. P.R.

Tabulated results of tests with Sitka Spruce, White Oak and Sugar Maple show that, if gluing conditions are good, it is possible to make, with smooth flat surfaces, joints equal in strength to those produced with roughened surfaces.

1006. SHIM, C. S. **The effect of variation of assembly time on glue-bond strength.** *Coll. Theseon (Sci. nat.) Univ. seoul.* No. 2, 1955 (61–74). 13 refs. [E.e.kor.]

In trials with Birch plywood, shear strength decreased with increasing assembly time from one to 70 min. For phenolic resin the maximum permissible time was 50 min. for closed and 10 for open assembly, and for soybean glue 15 and 5 min. respectively.

1007. SAHAROV, M. D. Sokraščenie vyderžki v presse zagotovok skleivaemyh pri naružnom obogreve. **[Reduction of the pressing period for glued articles in a press with heat supplied from outside.]** *Derev. Prom.* 5 (5), 1956 (11–3). [Russ.] P.R.

Planks 800 × 250 × 150 mm. were glued together with thermosetting glues (Soviet KB-3 and VIAM-B3) in a special apparatus where they were subjected to pressure and heat (air ≮ 100° C.). When the glue had set (in ca. 10 min.) to a depth of ca. 10 mm. the glued members could be safely taken out of the press, and setting of the remaining glue took place outside the apparatus. In the outer zone, the strength of the glue-line increased rapidly during the first 20–30 min., whereas in the interior a corresponding increase of strength required ca. 5–6 hours. Calculations based on certain assumptions confirmed the value of 10 mm. for the depth of the set glue-line that would secure the bonding between the elements. A stress diagram is given. Geometrical factors (thickness/width ratio, and thickness of board) have an important effect on the transverse rigidity of the boards during setting outside the press; the thickness/width ratio should be > 0·1. Very good results were obtained when 500 planks of 130 × 215 × 3450 mm. were glued by this method using an air temperature of 90–170° C. and applying the pressure and heat for 15–30 min.

825. Cleaving. Adzing. Mechanical Comminution

See Nos. 487, 1015.

826. Peeling. Slicing. Trimming, Edging etc. of Thin Sheets

See Nos. 1027, 1033, 1040.

827. Bending. Moulding (other than by Cutting)

1008. DICKENSON, T. A. **Development of new lamination technique.** *Woodwkg. Ind.* 14 (2), 1957 (75–6). P.R.

The method enables a given laminate to be moulded with only one male or female mould made from metal, taking advantage of the tendency of rubber loaded in compression to flow like a fluid. The method is briefly described and illustrated.

829.1. Finishing

See also Nos. 1032, 1154.

1009. BROWN, L. G. **Automatic sanding.** *Pap. Amer. Soc. mech. Engrs.* No. 57-*WDI*-6, 1957. pp. 4. P.R.

Illustrated description of the main types of automation adopted in sanding, and of the economy introduced by automatic sanding.

1010. DICKENSON, T. A. **New durable coating for wood surfaces.** *Woodwkg. Ind.* 13 (8), 1956 (435–6). P.R.

The coatings are of cotton fabric impregnated with a cellulose 'resin' closely related to conventional

lacquer 'resin'. The roll of material is dipped in an activator solution for a few seconds, and then applied by hand to the wood.

1011. Purslow, D. F. **Experiments with oil-type finishes.** *Timb. Technol.* 64 (2205), 1956 (361–3). 3 refs.

Tests on planed samples of *Thuja plicata* and *Khaya ivorensis*, using raw linseed oil (undiluted or diluted to 50% with a hydrocarbon solvent), PCP solution, PCP water-repellent solution, or mineral oil, showed that weather-caused deterioration (discoloration, fine checks, erosion of early wood) can be prevented by treating the surface with a suitable finish. The best of those tested was linseed oil (whether undiluted or diluted), though its protective action did not last long.

83. Timber Manufacturing Industries and Products. Uses of Wood as Such

See also No. 462.

831. Fuelwood and Various Types of Rough Timber

See also Nos. 784, 973, 1016, 1064–72.

1012. Jakovlev, N. I., Sirokov, A. P., and Zapreev, S. I. **Industrial use of wooden anchor-bolt support.** *Ugol', Moskva* Apr., 1957 (37–8). [Russ.] From *abstr.* in *Fuel Abstr.* 22 (3), 1957 (No. 2155). P.R.

Examples are given, with illustration, of the successful use of timber rods, with hardwood or metal wedges in their ends, as anchor bolts—i.e. as roof bolts, but not necessarily in the roof. They are 800–1200 mm. long and 38–40 mm. in diam. When tested, a Beech rod failed at 3·84 tons. The useful life is 1 year.

1013. Gneist, A. Holzschwellen. **[Wooden sleepers.]** *Eisenbahntechnische Rundschau* Sonderausgabe No. 8, 1957. pp. 18. Many refs. [G.] From *abstr.* in *Holz-Zbl.* 83 (84), 1957 (1047).

A world-wide review, with special reference to German conditions, covering dimensions in use, demand and supply, suitable timbers and their durability etc., but chiefly preservation in all its aspects (techniques, preparations, wood properties affecting impregnation, durability of treated sleepers, types of defects, after-treatment etc.).

1014. Vintilă, E. Cercetări asupra procesului de degradare a traverselor de fag puse în cale în stare neprezervată şi asupra impregnării lor. **[Studies on the process of decay in untreated Beech sleepers, and methods of impregnating them.]** *Industr. Lemn.* 4 (11), 1955 (430–3). 4 refs. [Rum.russ.]

It was found that decay begins on the underside of sleepers; red heart is more resistant than normal wood; contact with the soil favours decay; of sleepers that had been in service for 1–3 years, 23–33% were sound; after-treatment of such sleepers presents no technical difficulties.

832. Mills, Their Functions and Products

832.1. Sawmills and Planing Mills

See also Nos. 786, 872, 979 *et seq.*, 1124, 1128, 1134.

1015. Hyler, J. E. **Modern sawmilling. Parts 65–75.** *Sth. Lumberm.* 194–195 (2423–2433), 1957 (43 . . . 48; 43 . . . 48; 43 . . . 54; 45 . . . 48; 43 . . . 50; 39 . . .42; 45 . . . 50; 43–4; 39 . . . 46; 37 . . . 40; 45 . . . 50).

Waste disposal, briquetting systems, barkers and chippers.

1016. Canaway, G. **The mechanical sawing of railway sleepers in N.S.W.** *Tech. Notes For. Comm. (Div. Wood Technol.) N.S.W.* 10 (3/4), 1957 (5–12).

Describes 5 fixed and 6 portable mills (7–10 h.p.) with details of sleeper specifications, species, prices, output, cost of equipment and future development.

1017. Guttenberg, S., and Perry, J. D. **Weight-conscious lumbermen.** *Sth. Lumberm.* 195 (2430), 1957 (54, 56).

Graphs based on trials with 120 average logs of Loblolly and Shortleaf Pine at an Arkansas mill, show the amount of chips, in tons produced per 1000 bd. ft., for 3 grades and 4 diameter classes, assuming (*a*) normal and (*b*) 'weight-conscious' sawing. Cost calculations etc. are given to help in deciding whether a given log, or part of it, should be made into chips or into low-grade timber. [Cf. *F.A.* 18 No. 3261.]

1018. Mărgineanu, I. Tabela indicatoare privind randamentul cantitativ al cherestelei de răşinoase. **[Sawn outturn table for mixed conifer logs.]** *Industr. Lemn.* 6 (1), 1957 (6–8). [Rum.russ.g.]

Presents and explains the use of a table for calculating yield of sawn timber for 4 log diameter classes with varying proportions of different grades.

1019. Redman, G. P., and Willard, R. **Short log bolter for furniture stock.** *Bulletin, Department of Engineering Research, North Carolina State College, Raleigh, N.C.* No. 62, 1957. pp. v + 56 + 30 tbls. 1 ref. P.R.

Presents the results of experiments in 1954/56 at N.C. State College in producing furniture stock from short logs (bolts) by sawing on a short-log bolter saw, the species tested being Poplar [*Liriodendron tulipifera*?], Sweet Gum and Oak, with the following conclusions: (1) Total green yield can be accurately predicted from diagrams which use specific values for (*a*) the method of sawing, (*b*) green thickness and (*c*) width of saw kerf. (2) The effect of log diam. on total green yield can be accurately predicted. (3) Length of the log apparently had no effect on yield. (4) Quarter sawing showed a higher yield than flat sawing for stock clear on one face. (5) Low-grade Poplar logs showed a much lower yield of stock clear on one face than Oak logs or Sweet Gum logs. (6) Quarter sawing of logs of Oak and Sweet Gum showed much lower drying and ripping losses than plain sawing. *From authors' summary.*

1020. Wikstrom, J. H. **Lodgepole Pine—a lumber species.** *Res. Pap. Intermt. For. Range Exp. Sta.* No. 46, 1957. pp. 15.

Data from a sawmill in 1955 show the effect of Lodgepole Pine tree size on sawing time, on grade and width recovery and on the index of selling value by grade and product. The physical properties and grade recovery of Lodgepole Pine compare favourably with those of Ponderosa Pine. The chief difficulty is in marketing the high % of narrow boards from small trees. An important use of the wood is for panelling.

1021. FUCHS, P. Considérations pratiques sur une petite exploitation forestière en Ituri. **[Practical observations on a small logging and sawmilling enterprise in Ituri [Belgian Congo].]** *Bull. Inform. Inst. nat. Étude agron. Congo belge* 6 (3), 1957 (133–51). 1 ref. [F.]

Gives details, based on a temporary sawmill at Lekwa, of the cost of intstallation, the equipment, organization and method of working, and the outturns obtained, with a calculation of the cost/cu.m. sawn, for two cases: (*a*) with one European manager, (*b*) with an artisan sawyer as proprietor.

1022. **Twin saw portable bush mill.** *For. Equipm. Note, FAO* No. *D.*11.57, 1957. pp. 1.

Manufactured by Stenner Ltd., Tiverton, Devon.

832.2. Veneer and Plywood Mills, including the Manufacture of Composite-Wood Assemblies

See also Nos. 786, 979, 1001 *et seq.*, 1124, 1138, 1159.

1023. CURRY, W. T. **The strength properties of various plywood species.** *Timb. Technol.* 64 (2205), 1956 (368–9). 8 refs.

Includes mean strength values for $\frac{3}{16}$-in. three-ply made for 13 species, and a table of basic data for these species, to be used in suitable equations for evaluating plywood strength. [Cf. *F.A.* 16 No. 3469.]

1024. LEAVITT, R. A. **Can we use a higher percentage of low grade logs?** *Veneers & Plyw.* 51 (3), 1957 (12–3, 19). P.R.

Analyses veneer yield, for different veneer grades, obtained from logs of different grades.

1025. **[Sliced veneer from *Quercus lyrata*.]** *Rep. Sth. For. Exp. Sta. 1956*, 1957 (82–3).

Sample logs of this Oak which, because of seasoning difficulties, has remained uncut in many areas, yielded attractive $\frac{1}{32}$-in. quarter-sliced veneers.

1026. **Veneer cutting and drying properties. Aspen and hybrid Poplar.** *Rep. U.S. For. Prod. Lab., Madison* No. 1766–13, 1957. pp. 4 + 4 tbls. 7 refs.

Populus tremuloides, P. grandidentata, P. charkowiensis × *P. robusta, P. charkowiensis* × *P. caudina.*

1027. POUZEAU, P., and PRADAL, H. Aspects nouveaux dans la technique du déroulage de l'okoumé. **[New developments in technique for peeling *Aucoumea klaineana* veneer.]** *Bois For. Trop.* No. 54, 1957 (41–50). [F.e.span.]

Reviews the results of studies on veneer-peeling, with particular reference to adjustments to regulate pressure. Optimum pressure for every thickness of veneer has been determined, and the possibility of automatic regulation by an electric device based on a fault-detector is discussed.

1028. VINTILĂ, E. Cercetări asupra uscării furnirului de fag în petrolatum. **[Seasoning Beech veneer in petrolatum.]** *Industr. Lemn.* 5 (12), 1956 (516–23). 8 refs. [Rum.russ.g.]

[Cf. *F.A* 17 No. 2177.] In pilot experiments, 5-mm. Beech veneer was dried in 15 min. at 120° C. from 80–100% to 10–12% m.c. Consumption of petrolatum was 350–400 g./sq. m. (150 kg./cu.m. of wood).

1029. VINTILĂ, E., ROMAN, H., and BOICIUC, E. Cercetări asupra uscării furnirului de fag cu agenți organici volatili. **[Seasoning Beech veneer by the use of volatile organic agents.]** *Industr. Lemn.* 6 (3), 1957 (95–8). 8 refs. [Rum.russ.g.f.e.]

Seasoning of Beech veneer with hot petrolatum results in discoloration, but the use of volatile distillation products of the benzine type at temperatures of 102–120° C. for 15 min. dries it from 60–76% m.c. to 8–15% without discoloration or other degrade (drying schedules and needful qualities of the drying agent tabulated).

1030. SMITH, G. W. **Progressive management in plywood manufacturing.** *Pap. Amer. Soc. mech. Engrs.* No. 57-*WDI*-2, 1957. pp. 3. 1 ref. P.R.

Discusses the merits of various core materials and the application of mechanical processes. Examples where mechanization and automation of plywood-manufacturing processes have successfully reduced costs are shown in diagrams.

1031. DOSKER, C. D., and DURST, S. H. **Core materials for plywood—standard lumber cores.** *Pap. Amer. Soc. mech. Engrs.* No. 57-*WDI*-10, 1957. pp. 12. P.R.

Illustrated description of the 6 types of wood core stock regularly produced in America. Their merits, the selection of species, and the manufacture of the core stock are discussed.

1032. PERRY, T. D. **Plastic faced plywood.** *Veneers & Plyw.* 51 (2), 1957 (12–3, 40). P.R.

Illustrates and describes the uses of plastic-faced plywood and its working.

1033. PETERSON, R. W., and FEIHL, A. O. **Tenderizing and loose cutting of veneers—their influence in reducing warping in plywood.** *Comp. Wood.* 4 (1/2), 1957 (23–6). P.R.

Results of warping tests with 5-ply constructions of Yellow Birch (straight-grained $\frac{1}{24}$-in. face veneers, straight-grained $\frac{1}{8}$-in. core veneers) and with lumber-core constructions, as balanced as possible and with grain directions in the cross-bands crossed, showed that neither loose cutting nor tenderizing of cross-bands was effective in reducing warping in the conditions studied. The loose-cut veneer was cut with little pressure applied at the pressure bar and had lathe checks extending through roughly $\frac{1}{2}$ its thickness.

1034. SOKOLOV, B. N. O koroblenii fanernyh plit. **[Warping of plywood panels.]** *Derev. Prom.* 5 (6), 1956 (11–4). [Russ.] P.R.

Warping of plywood panels can be caused by one or more of the following: (1) Asymmetrical distribution of moisture content in the assembly of plies before pressing, an asymmetry of 0·5% m.c. causing a warping in excess of the permitted (Soviet standard) value. (2) Asymmetry of heat distribution during pressing; considerable warping resulted from asymmetry in heating and cooling temperature curves at equal distances from the middle plane of the panel, whereas thermal symmetry yielded straight panels. The degree of compression was increased in veneers that were held for a longer time at high temperature and were better cooled in the press. (3) Redistribution of temperature and moisture content when panels, after pressing, are stacked while the interior of the panels is still warm; this results in formation of permanent stresses. Observations over 75 days on 3 stacks of forty 220 × 152·5 × 2·5 cm. plywood panels (2 stacks of warped and 1 of straight) stacked in a dry storeroom without heating showed that, as a rule, the form obtained during manufacture is permanent, whether straight or warped.

1035. FRASHOUR, R. G., COOKE, W. H., and OVERHOLSER, J. L. **Bevel siding from common lumber.** *Bull. Ore. For. Prod. Lab.* No. 5, 1957. pp. 18.

Low-grade boards of Douglas Fir and Ponderosa Pine were bonded with exterior glue to veneer covering and resin-fibre overlay, and shaped into bevelled weather-boarding. A test house with wall covered with this boarding was exposed for a year, relatively high r.h. and temperature being maintained within. Results indicate that attractive and serviceable weather-boarding can be made in this way from common boards.

1036. NISKANEN, E. **Glued laminated timber structures.** *Aust. Timb. J.* 23 (4), 1957 (4 . . . 33, 108). 22 refs.

[Cf. *F.A.* 16 No. 4607.] Covers advantages and limitations, scarfed end and butt joints, gluing and moisture content, and some types of structures.

833. Timber in Buildings and Engineering Structures (Manufacture and Use)

833.1. Building Components and Fittings: General

See also Nos. 1035–6.

1037. **Timber engineering.** *Wood* 22 (7), 1957 (276–86).

Includes articles on wide-span trusses, a timber bridge, timber walling, roofs for small houses, and joint fasteners and timber connectors.

1038. **Timber engineering.** *Wood* 22 (8), 1957 (314–25).

Includes articles on the timber design for the Hammersmith County School, the timber shell construction (hyperbolic paraboloid) for the Wilton Royal Carpet Co., and laminated arch construction for a community hall. The first includes a wide variety of traditional and experimental forms. The second is entirely new with advantages of lightness, speed of erection, thermal insulation, large spans, avoidance of shuttering, small demand in skilled labour, and great reduction of cost.

833.3. Special Uses in Factories and Workplaces

See No. 1073.

834. Shingles. Cooperage. Packing Containers. (Manufacture and Use)

See also No. 1113.

1039. DALE, A. C., and SCHMIDT, J. L. **A study of farm building materials on farms in the North Central Region. I. A field survey of wood shingle roofs.** *Bull. Ind. Agric. Exp. Sta.* No. 601, 1954. pp. 28. P.R.

Includes a detailed analysis of factors responsible for deterioration in 575 Cedar shingle roofs averaging 23 years old, and some observations on shingles used on side walls.

1040. IMMELMANN, W. F. E. **Quality and performance of sliced shook from small Ponderosa Pine logs.** *Rep. U.S. For. Prod. Lab., Madison* No. 2076, 1957. pp. 40. P.R.

Small-diameter, knotty logs were shown to be suitable for slicing into slats for box-shooks ($\frac{3}{16}$ and $\frac{1}{5}$ in. thick), a cutting temperature of ca. 180° F. being better than 140°. Stock dried in a veneer drier was less strong but smoother than that dried in a kiln. Sliced shooks showed a greater tendency to warping, splitting and roughness than sawn shooks. In rough-handling tests, the average performance of the sliced shooks was ca. 90% of that of the sawn shooks.

1041. ORĂDEANU, T., PETRICAN, N., and MARINESCU, D. Montarea şi exploatarea tuburilor din placaj. **[The installation and utilization of plywood tubing.]** *Industr. Lemn.* 6 (1), 1957 (13–8). [Rum.]

Illustrated by scale diagrams.

835. Industrial and Domestic (Utility) Woodware. Toys and Models. Sports and Recreational Goods. Musical, Scientific and Mathematical Instruments. Surgical Applications etc.

See also No. 1171.

1042. U[Y]EMURA, T., and SAITO, H. **[Wood for storage battery separator in Japan. II.]** *Bull. For. Exp. Sta. Meguro, Tokyo.* No. 98, 1957 (143–68). 9 refs. [Jap.jap.e.e.]

Chamaecyparis taiwanensis, C. pisifera, Picea glehnii and *P. jezoensis* were tested as in previous work [see *F.A.* 12 No. 2220] and compared with species, chiefly *C. obtusa, Abies sachalinensis*, and the Hondo variety of the Jezo Spruce of that investigation. These species were subjected to short-circuited 6-volt battery tests. All are suitable if dried by methods (indicated) that keep their electrical resistance sufficiently low.

1043. BLOOM, J. L., LANE-PETTER, W., and PORTER, G. **Use of wooden boxes for breeding mice.** *Nature, Lond.* 180 (4579), 1957 (251).

Wooden boxes have proved superior to metal ones. The box now in regular use at the experimental mouse-breeding unit at Hampstead is made of imported Cedar or other suitable hard wood with bottom of $\frac{3}{16}$-in. plywood, the whole glued with phenolformaldehyde resin. Wooden boxes that have been in use for two years and regularly sterilized by steam or boiled in water are almost as good as new.

836. Furniture and Cabinet-Making. Carving. Marquetry. Wooden Ornaments

See also Nos. 1019, 1111, 1160.

1044. JOHNSON, E. S. **Automatic machining in furniture manufacture.** *Pap. Amer. Soc. mech. Engrs.* No. 57-*WDI*-8, 1957. pp. 4. P.R.

A brief review of the history of mechanization in some phases of furniture manufacture, with special reference to mechanization and mechanical handling in machining parts after they have been cut to rough dimensions in the rough mill.

1045. MENON, P. K. B., BURGESS, H. J., and WYATT-SMITH, J. **Malayan timbers for furniture.** *Malay. Forester* 20 (3), 1957 (152–62).

Discusses desirable properties and selection of suitable timbers, gives tables showing some world timbers used and some Malayan timbers suitable for furniture, with notes on their properties, and indicates the availability of Malayan species listed.

838. Vehicles (including Ships, Boats, Aircraft)

See also No. 942.

1046. RAWLINS, G. B. **Timber for railway rolling stock.** *Timb. Technol.* 64 (2206), 1956 (420–3).

Outlines trends in constructional materials for passenger coaches and wagons, and describes in some detail the use of timber in modern carriage construction, with reference to the choice of suitable species and to the preservation of timber.

839.1. Wood Wool and its Manufacture

1047. GIORDANO, G. Le bois de peuplier au service de la mode féminine. **[Poplar wood in the service of women's fashions.]** *Rev. Bois Appl.* 12 (6), 1957 (16–8). [F.]

Describes the manufacture of very long, narrow shavings from the wood of American Poplar hybrids, used in Italy for making plaited articles (mainly hats).

839.8. Industrial Waste Wood, its Processing and Uses

See also Nos. 358, 979, 1015, 1161–3.

1048. PREDOIU, F. Preuscarea rumeguşului cu ajutorul gazelor de ardere evacuate de la cazane. **[Drying of sawdust by means of combustion gases from boilers burning wood-waste.]** *Industr. Lemn.* 6 (5), 1957 (174–85). [Rum.russ.g.f.e.]

Discusses the possibility of drying sawdust by combustion gases in pneumatically operated kilns, including a table showing the amount of heat necessary to remove different quantities of moisture from 1 kg. of sawdust.

1049. **Wood waste briquetting machines.** *Timb. Tr. J.* 222 (4221), 1957 (88). 1 ref.

Reports on the U.K. Forestry Commission's enquiry (for stimulating local utilization) into models, briquette size, moisture content requirement in sawdust, and output and cost of machines made in the U.S.A., Switzerland, Germany and Denmark.

84. Preservation and Other Treatments to Improve the Properties of Wood. Damage by Biological Agencies and its Control. Seasoning. Timberyard Practice

841. Wood Preservation

See also Nos. 1013–4, 1079–80.

1050. **Proceedings of the Third Northeastern Wood Preservation Conference (New Haven, Connecticut, November, 1955).** *Bull. Ntheast. Wood Utiliz. Coun.* No. 45, 1957. pp. 150. Price $3·0. P.R.

Includes the following reports and communications: Service records (*W. E. White*); Report of committee on treating plants in the North-east (*L. S. Hamilton*); New ideas on wood preservative classifications (*W. W. Koch*); Treating specifications (*P. D. Brentlinger*); Committee report on project to determine fungi causing wood products decay in the Northeast (*R. Zabel*); Some mechanisms of fungi-toxic action (*J. C. Horsfall* and *S. Rich*); Physical and chemical changes associated with wood decay (*T. C. Scheffer*).

1051. **Timber preservation in building: extracts of papers read at the annual convention of the British Wood Preserving Association, Cambridge.** *Wood* 22 (7), 1957 (287–90). 3 refs.

Timber preservation from the point of view of the architect (*E. L. Bird*); *In situ* treatment of building timbers for the control of wood-destroying insects and fungi (*S. A. Richardson*); The compatibility of wood preservatives and glues (*A. J. Bune*).

1052. CARR, D. R. **Timber preservation in New Zealand.** Government Printer, Wellington. 1957. pp. 19. 14 refs. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand 1957.)

1053. MACLEAN, J. D. **Seasoning and checking of timbers before and after [preservative] treatment.** *Proc. Amer. Wood Pres. Ass.* 52, 1956 (35–48). 6 refs. P.R.

Discusses the following factors affecting the shrinkage and checking of wood: density; class (coniferous or broadleaved); occurrence of collapse; differences in tensile or compressive strength ⊥; rate of seasoning; resistance to movement of moisture; depth and permeability of sapwood; dimensions; presence of boxed heart and position of pith in sawn timber; time of year of felling and seasoning; meteorological factors during seasoning; method of stacking; exposure to winds; exposure to direc

sunshine and relative position of sun rays. Excessively severe treating conditions may also cause considerable checking.

1054. GIESEKING, E. Auftraggeber und Holzschutz im Hochbau (gemäss DIN 68 800). [**Customer and wood preservation in house construction (according to DIN 68 800).**] *Repr.* from *Architekt, Essen* 1956 (10). pp. 3. [G.] P.R.

Discusses this new German standard (and DIN 52 175 of 1954, containing definitions and prescriptions used in the new standard) with reference to its legal implications.

1055. BAVENDAMM, W. Überblick über die Holzschutzpatente der Bundesrepublik Deutschland im ersten Halbjahr 1957. [**Wood preservation patents issued in W. Germany during the first half of 1957.**] *Holz-Zbl.* 83 (93), 1957 (1143). [G.]

Among the 7 patents mentioned, one is for a plastic substance containing preservatives, which hardens at room temperature, for inclusion in hollow spaces in wooden or partly wooden structures; one is for the impregnation of living trees in such a manner that the preservative, introduced through the horizontal incisions, diffuses in the ascending sapstream, while the descending sapstream in the cambial region remains interrupted; and one is for the preservation of wood by heating and steaming in an insulated container, the effect being supposed to be due to the formation of substances of a 'phenolic' type in the wood.

1056. Holzschutzmittel-Verzeichnis. [**List of wood preservatives.**] Technische Zentralstelle der deutschen Forstwirtschaft, Hamburg. 13th ed., 1957. pp. 20. [G.] P.R.

Gives an alphabetical list of preservatives, and classified lists of preservatives for application to timber before and after installation, fireproofing agents, and priming coats with anti-bluestain effect. The names and addresses of German manufacturers of preservatives, and instructions for use are also given.

1057. COCKCROFT, R. **Movement of creosote in wood caused by drying of volatile solvents.** *Wood* 22 (8), 1957 (331–7). 13 refs.

Gives data for creosote concentration gradients in the sapwood of Corsican Pine and Beech impregnated with 5 and 30% solutions of creosote in benzene, toluene or xylene. Steep gradients were set up in both lateral and longitudinal directions by the lower strength as the solvent evaporated. The use of such solvents to obtain low retentions may introduce considerable uncertainty in tests.

1058. BERGHOFF, W. Beiträge zur Verfahrenstechnik einer quantitativen Bestimmung von Fluor im Holz. [**The quantitative determination of fluorine in wood.**] *Holzforschung, Berlin* 11 (3), 1957 (80–5). 13 refs. [G.g.e.] P.R.

Describes a method of determining F, when it is present in the form of water-soluble compounds, by direct analysis of leachates. Where distillation cannot be avoided, an improved distillation method is suggested.

1059. KÖRTING, A. Kontrollmöglichkeiten chemischen Holzschutzes im Bauwesen. [**Means of checking the application of wood preservatives in building construction.**] *Holz-Zbl.* 83 (59), 1957 (757–8). 14 refs. [G.]

Discusses tests for depth of penetration, quantitative analysis of preparations containing fluorine and factors involved, e.g. structure of wood, m.c., time. When applied by brushing on, penetration of bifluorides (45 g./sq. m.) in Pine was 9–11 mm. after 250 days, in Spruce 6–8 mm. after 30 and 6–11 mm. after 80 days (no increase in wood that had been dried in between). With silicofluorides, penetration in Spruce after 80 days was only 3 mm.

1060. PACHOLIK, A., and SILBERNAGEL, H. Das Problem der Fixierung von U- and UA-Salzen. [**The problem of the fixation of U and UA salts.**] *Holzforsch. u. Holzverwert., Wien* 9 (2), 1957 (21–4). 10 refs. [G.g.e.] P.R.

Investigates the problem of improving the fixation of Wolman salts (U salts without As, and UA salts with As) by: (1) adding salts of heavy metals; (2) use of acidified or acid U and UA salts; and (3) use of complex borofluorides having the general formula Me $[BF_x(OH)_y]$, where Me is a metal, $x + y = 4$, x is 2, 3 or 4, and y is 0, 1 or 2. The first method implies strong acidification of the preservative (to prevent precipitation of the heavy-metal arsenate in the solution), and presents many technical difficulties in the preparation of durable preservatives. Preservative solutions with added free acid should have pH = 3. Instead of adding a free acid, the neutral salts present in U or UA salts can be replaced by acid salts or by the corresponding free acids (e.g., bifluorides can be substituted for neutral fluorides, and chromic acid for chromates). As some acids exist in wood or are formed there during the process of reduction, the added acid should be only a small fraction of the stoichiometric quantity. Available results suggest that maximum fixation of F from acid U and UA salts cannot be effected by acidification only; the nature of the alkalis present in the salts (particularly a correct K/Na ratio) seems to be very important. In a new method using the alkali salts of hydrofluoboric acid, the F is supplied directly from the F/B complex to form the Cr/F complexes, without necessitating the production of free bases on the reduction of the Cr compound. The alkali fluoborates are able, by virtue of internal transformation, to neutralize substances having an alkaline reaction, which are released, e.g. when Cr arsenate is formed. Further advantages of this method are a very slight tendency towards corrosion and a slow rate of fixation.

1061. MILLER, D. J., and GRAHAM, R. D. **Seasoning and preservative treatment of Tanoak lumber.** *Rep. Ore. For. Prod. Lab.* No. *P*-3, 1957. pp. 8 + 5 photos, 5 tbls. 13 refs. P.R.

Tanoak [*Lithocarpus densiflora*] 1 in. thick was kiln-dried to 3 different m.c. ranges, after which it was treated with water-soluble preservatives; after treatment it was first air- and then kiln-dried. The sapwood was easily penetrated with preservatives, but it was necessary to dry to $< 40\%$ m.c. in order to

obtain retentions of > 20 lb. /cu. ft. Dark heartwood was very resistant to treatment; it was also more prone to checking and collapse on drying than sapwood. Most sapwood material developed some form of warp on drying but surface checks were not frequent. *From authors' summary.*

1062. KEINO, K. **[On the ammonium salt of pentachlorophenol.]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 96, 1957 (145–53). 5 refs. [Jap.jap.e.e.]

Describes the preparation, properties and possible use of this substance for the fixing of free pentachlorophenol in wood, with an equation for its gradual loss by sublimation.

1063. YEARSLEY, M. G. **Report of trials of copper naphthenates, mercuric naphthenates and gas oils as wood preservatives.** Government Printing Office, Trinidad. 1957. pp. 11. 2 refs. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

Tests have proved conclusively that Cu and Hg naphthenates are efficient wood preservatives. A 20% solution of Cu naphthenate dissolved in gas oil may render White Pine, a wood very susceptible to attack by termites and fungi, resistant for > 16 years. Toxicity appears to be property of the Cu or Hg ion rather than of the naphthenate radical, which serves primarily as a waterproof carrier and prevents the metal ions from being leached out of the wood by water. [Cf. *F.A.* 8 No. 469.]

1064. GRAHAM, R. D. **The preservative treatment of eight Oregon conifers by pressure processes.** *Proc. Amer. Wood Pres. Ass.* 52, 1956 (118–39). P.R.

Sleeper sections (ca. 3·5 × 4·5 × 48 in.) of air-dried coast-type Douglas Fir, Shasta Red Fir, White Fir, Mountain Hemlock, West Coast Hemlock, Lodgepole Pine, and Sitka Spruce, incised on 2 surfaces, were pressure-treated with a creosote/petroleum solution. Four charges of each species were treated to practical refusal at a maximum pressure of 125 lb./sq. in.; 4 additional charges of each species were treated with varying maximum pressures and pressing times. Recommendations based on the results of tests are made for treating each species. *From author's summary.*

1065. CONNERS, W. M., and BRAMHALL, G. **An evaluation of factors affecting the rate of drying of round Western Hemlock during the boiling under vacuum process.** *For. Prod. J.* 7 (6), 1957 (205–8). 2 refs.

Presents an approximate formula, based on 14 tests with logs varying in size, density and moisture content, at temperatures ranging from 150° to 210° F., pressures ranging from 'just boiling point' to 28 Hg, and boiling times of 24, 41 and 60 hours relating moisture removed per cu. ft. to these factors [cf. *F.A.* 17 No. 933].

1066. WARRELMANN, E. Feststellungen an öl- und salzimprägnierten Holzmasten nach der Statistik eines grossen Elektrizitätsunternehmens. **[Observations on oil- and salt-impregnated poles from the records of a large electricity undertaking.]** *Elektrizitätswirtschaft, Frankfurt am Main* 55 (23), 1957 (869–74, *A*14). [G.e.] L.S.

The state of preservation, after various periods of service, of 130,000 Spruce poles treated with salts (1), and 220,000 creosoted Pine poles (2), was about equal, but decay in (1) was more external (probably owing to leaching) and near the base (where it is fairly easy to detect and to treat), while (2) showed more internal decay, suggesting insufficient penetration of sapwood/heartwood transition zones, frequently in the top and middle sections. Trials with after-treatment by salt cartridges seemed promising. Instruments for treating and examining pole tops without interrupting the supply of electricity are briefly described and illustrated.

1067. SCHULZ, G. Zwei Jahre Freilandversuche über die Wirkung von Nachschutzmitteln an Holzmasten. **[Two years of open-air trials on the effect of after-treatment on poles.—With discussion.]** *Elektrizitätswirtschaft, Frankfurt am Main* 55 (23), 1957 (850–2, *A*-13). [G.e.] L.S.

A summary of first results of research at Hann. Münden, Berlin-Dahlem, and Reinbek. The amount of water running down a smooth model pole of 10 m. × 20 cm. was estimated at 350 litres/year. Treatment affected run-off. It was greatest on 2- to 3-year-old, and least on 15- to 20-year-old creosoted poles. Near the ground, water penetrated Pine more easily than Spruce. Most of it penetrated from the circumference, less than expected from the butt cross-section. Vertical movement of moisture was ca. 30 cm. in 43–51 days.

In bandaging experiments, penetration of NaF paste after 1 year was greater in depth and vertical diffusion than that of a 'U-salt' paste. Rate of penetration was greater in Pine, but depth reached after 1 year was equal for Pine and Spruce. This depth was less in all impregnated poles, particularly if freshly impregnated, than in untreated ones.

Standard zirconium-alizarine tests gave higher penetration values for 0·2% NaF than quantitative tests, suggesting that caution was needed in their evaluation.

In discussion, *H. Heinze* described a device for the after-treatment of standing poles against attack by *Hylotrupes bajulus*. This consists chiefly of a system of nozzles, flanked by brushes, arranged on a hinged ring and connected to a pump by a hose. The ring is laid round the pole and moved up and down with the help of a temporary pulley fastened near the top. Results using Xylamon and Carbolineum, have generally been good.

1068. DALE, F. A. **Fence post treatment on King Island.** *For. Prod. Newslett. C.S.I.R.O. Aust.* No. 233, 1957 (1–3). 1 ref.

An illustrated description of a portable pressure impregnation unit costing £1250 (including a £450 trailer), with a capacity of 500 posts/day (6 ft lengths of *Eucalyptus viminalis, Melaleuca* spp. and *Pinus radiata*). Details are given of cost, absorption (of Cu-Cr-arsenic), expected life etc. A 2-h.p. water-cooled petrol/kerosene pump delivers 850 gal./hour with pressures to 100 lb./sq. in.

1069. WALTERS, C. S., and PETERSON, K. R. **The preservative treatment of electric fence stakes; ten-year *ad interim* report on Project 55–331 B**

For. Note Ill. agric. Exp. Sta. No. 74, 1957. pp. 9.

The project was initiated in 1947 to determine the value of cold-soaking treatment of electric-fence posts of *Pinus strobus* and 'Southern Yellow Pine'. Various preservatives were used with soaking periods of 24 and 48 hours. After 10 years there was no significant difference between treatments, but two-thirds of treated posts were still serviceable, whereas 85% of controls had failed.

1070. PANEK, E. **Preservative treatment of Jack Pine and Longleaf Pine posts by the hot-and-cold bath and its boiling-in-water adaptation.** *Rep. U.S. For. Prod. Lab., Madison* No. 2085, 1957. pp. 6 + 2 tbls., 2 photos. 6 refs. P.R.

Uninfected posts of both species showed low retentions and limited preservative penetration when given a hot bath for 1 hour and a cold bath for ½ hour. Preservative retention was more than sufficient and penetration was satisfactory when the hot bath lasted 1½ hours and the cold bath 2 hours. Mould infection caused excessive retentions in posts of both species. *From author's summary.*

1071. VINTILĂ, E., and POPOVICI, V. Impregnarea traverselor de fag prin metoda băii calde-reci folosind cilindri orizontali. **[Preservative treatment of Beech sleepers by hot-and-cold bath in horizontal cylinders.]** *Rev. Pădurilor* 1956 (10), (682–3). 3 refs. [Rum.]

1072. GRAHAM, R. D., and MILLER, D. J. **Full-cell treatment of kiln-dried Douglas Fir crossties with creosote and creosote-coal tar.** *Rep. Ore. For. Prod. Lab.* No. *P*-4, 1957. pp. i + 5 + 5 photos, 2 tbls. P.R.

Results of tests with 72 sleepers showed that while adequate penetration and retention were found possible with creosote/coal-tar mixtures, extended treating cycles would be required to obtain results comparable to those obtained with creosote alone.

1073. ROSS, F. F., and WOOD, M. J. **Soft rot in cooling towers.** *Timb. Tr. J.* 222 (4219), 1957 (69). 1 ref.

Extracts from a paper read to the meeting of the British Wood Preserving Association, July 1957, reporting on the experience of the Central Electricity Authority with its 415 cooling towers. For slats, Scots Pine is superior to Spruce, which is the equal of Douglas Fir. No hardwoods (except perhaps Greenheart) appear to resist soft rot. Packings do not suffer erosion or chemical breakdown if the water is not too alkaline or continuously chlorinated. Scots Pine will withstand biological decay for 25 years (the life of the turbine) if suitably treated with Celcure or Tanalith C (a dry powder, easily dissolved, of CuCr arsenate). The cost of the latter adds 10-12% to the cost of the packing.

1074. GRIFFITH, A. L. **Use of wood preservatives on transplant boxes.** *Rep. E. Afr. Agric. For. Res. Organ. 1955/56,* [1957] (59).

Tests were made of 3 preservatives: Celcure, (a copper-arsenic preservative), P.C.P. and Blundwood (creosote). P.C.P. appeared to have an adverse effect on *Pinus patula*, causing casualties and a yellowing of the plants.

1075. BAECHLER, R. H., and ROTH, H. G. **Laboratory leaching and decay tests on Pine and Oak blocks treated with several preservative salts.** *Proc. Amer. Wood Pres. Ass.* 52, 1956 (24–34). 52 refs. P.R.

Soil-block tests made with unleached treated Oak and Pine sapwood blocks showed differences in threshold values when a given chemical was tested against a fungus that was capable of attacking the other species. When close amounts of a chemical are retained in different species, the variability in effectiveness sometimes found in practice appears to be due to several sources, including the tendency of some resistant fungi to attack some species but not others. The chemical is leached much faster from ¾-in. cubes than from blocks of European size (1·5 × 2·5 × 5·0 cm.). The species of wood is of moderate importance in the rate of leaching of some water-soluble salts from small blocks that are kept water-logged. *From authors' summary.*

842. Treatments to Improve the Resistance of Wood to Physical and Chemical Agencies other than Fire

1076. ŠEJDIN, I. A., SMIRNOV, A. V., and DEMIDOVA, L. A. Tehnologija drevesnyh plastikov. **[Technology of improved wood.]** Goslesbumizdat, Moscow. 1956. pp. 240. 7 refs. [Russ.] Price *Roubles* 6·60. X.

Section 1 deals with the classification and physical and mechanical properties of various kinds of improved wood. Section 2 (technology of production and basic equipment) includes the following chapters: phenol-formaldehyde resins; technology of compreg manufacture; fundamentals of the technology of the manufacture of improved wood from laminae; impregnation of veneer in synthetic-resin solutions; drying of impregnated and coated veneer; preparation of assemblies; pressing; manufacture of different kinds of laminated improved wood; articles made from improved wood; the technical and economic features of the manufacture of laminated improved wood. Section 3 deals with mechanical working of improved wood. Section 4 discusses examples of the industrial application of these materials.

1077. RISI, J., and ARSENEAU, D. F. **Dimensional stabilization of wood. Part I. Acetylation.** *For. Prod. J.* 7 (6), 1957 (210–3). 47 refs.

Reviews literature on various methods of stabilization, and describes experiments on *Betula papyrifera* and *Abies balsamea* with pyridine or dimethylformamide as swelling agents and catalysts, and acetic-anhydride vapour for acetylation. Both acetyl content (a.c.) and anti-shrink efficiency [cf. *F.A.* 18 No. 4687] increased with treating times, while hygroscopicity decreased. With a.c. < 16%, hygroscopicity decreased with increasing relative humidity; beyond this it increased with r.h. The stabilization effect appeared to depend both on the bulking and on the reduction of hygroscopicity.

1078. RISI, J., and ARSENEAU, D. F. **Dimensional stabilization of wood: Part II. Crotonylation and crotylation.** *For. Prod. J.* 7 (7), 1957 (245–6). 2 refs.

[Cf. *F.A.* 17 No. 4505.] By crotonylation of pyridine-swollen wood with crotonic acid and acetic anhydride, anti-shrink efficiencies of 49–73% were obtained. It is believed that by this treatment the wood was mainly acetylated. Crotylation of pyridine-swollen wood with crotyl-chloride gave anti-shrink efficiencies of up to 80%, but the wood was severely degraded.

843. Fireproofing and Fire Resistance

See also No. 1056.

1079. BRUCE, H. D. **Effects of some preservative treatments on the flammability of wood.** *Proc. Amer. Wood Pres. Ass.* 52, 1956 (11–23). P.R.

Oak timber and Oak plywood were impregnated with 9 wood preservatives and 3 fire retardants (3 retentions of each) and tested by two fire-test methods. The inorganic water-borne preservative salts decreased the danger of ignition and flaming. The oil vehicles not subsequently removed from the wood increased the danger of ignition and rapid spread of flame. Moderate to heavy retentions of the fire-retardant compositions imparted to wood an outstanding fire retardance. The fire behaviour of each of the 36 treatments is indicated by tabulated data with illustrative figures. *From author's summary.*

1080. ABE, H., YOSHIKAWA, Y., and WATAKI, T. **[Studies on the fireproofing of wood (Report No. 1). Flammability test of wood treated with wood preservatives (Annex: Decay resistance test). (Part 1).]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 98, 1957 (127–36). 4 refs. [Jap.jap.e.*e.*]

The inflammability of *Cryptomeria japonica* and its resistance to *Poria vaporaria* were tested 3 years after treatment with 0·1–10% $CuSO_4$, NaF, $ZnCl_2$, $ZnSO_4$, $HgCl_2$, $Na_2As_2O_4$ and the Na salt of PCP. Differences in concentration of the treating solutions used did not seem to affect inflammability. The first two substances tended to increase inflammability and the third (a 'fire retardant') had no effect at the concentrations used. Further tests of the preservative action of the salts are desirable.

844. Attack by Plant Organisms

See also Nos. 515, 573.

844.1. Sap-staining and Mould Fungi

1081. HUDECZEK, F. Die Verhütung des Rotstreifes. **[Prevention of fungal red stain [in stored Spruce wood].]** *Allg. Forstztg.* 67 (5/6), 1956 (58–61). 2 refs. [G.g.]

Reports on investigations into the effect of felling season, storage, and treatment on the development of red stain, showing the importance of suitably manipulating moisture content. Barking stems after felling, and even more after a period of lying with crown intact, greatly reduced the % area affected. Prolonged storage in the forest, particularly in the shade, was unfavourable, and so, in general, was autumn felling, the wood tending to reach the critical spring period with critical m.c. (while winter-felled wood was still rather wet, and summer-felled wood rather dry for infection). Sprinkling at the timber yard practically stopped stain development. No relation was found between checking and staining.

1082. AOSHIMA, K., and HAYASHI, Y. **[Some information on *Ophiostoma coeruleum* (Münch) H. et P. Sydow, causing blue-stain in Japanese Red Pine (*Pinus densiflora*).]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 92, 1956 (41–50 + 9 photos). 19 refs. [Jap.jap.e.]

Describes the cultural characteristics and morphology of Japanese isolates, which wholly agree in the latter with the European *O. coeruleum* and are very similar to the American *O. piliferum.* Inoculations were successful on *P. densifolia, P. thunbergii* and (to a lesser degree) *P. banksiana* blocks. The stain is associated with bark-beetle epidemics killing Red Pine saplings from Kyushu to northern Honshu.

1083. GAMBOGI, P. Alterazioni chromatiche in legno di pioppo abbattuto. **[Stains occurring in the wood of *Populus tremula* after felling.]** *Ann. Sper. agr. (n.s.)* 11 (4), 1957 (lxxvii–xcvi). 33 refs. [It.it.e.] C.G.B.

Two types of stain occur: (1) blackish stains of little depth on the surface of the cut; (2) deeper yellow stains. From affected wood the following fungi were isolated: *Sphaeropsis ellisii, Pestalotia lignorum* sp. nov., and *Cytospora chrysosperma* and other species that remained sterile, all of which are described. From experimental inoculations it is concluded that (2) is caused by the sterile fungi and (1) by other species.

1084. EGUND, K. F., and JØRGENSEN, E. Angreb af skimmelsvampe på dampede bøgeemner udstablet til lufttørring, og en metode til svampenes bekæmpelse. **[Attack by mould fungi on steamed Beech squares, stacked for air-drying, and a method of control.]** *Medd. Træindustr. ForsknUdv.* No. 1, 1954. pp. 34 + 3 tbls., 1 gph. 21 refs. [Dan.dan.e.] I.M.I.

Discusses factors—stacking methods, accumulation of sawdust, season of sawing and steaming—affecting drying and fungus attack, and the successful control of the fungus by dipping or impregnating the squares with a 2‰ oxyquinoline sulphate solution.

844.2. Wood-destroying Fungi

See also Nos. 586–95, 944, 1014, 1050, 1075, 1080.

1085. ARZUMANJAN, G. A. Polučenie čistoj kul'tury griba iz poražennoj drevesiny. **[Method of obtaining pure cultures of fungi from infected wood.]** *Doklady Akademii Nauk Armjanskoj SSR, Erevan* 23 (4), 1955 [Page nos. not indicated]. [Russ.?] From *abstr.* in *Prehl. lesn. Lit.* 8 (3), 1957 (No. 829). [Cz.] P.R.

An apparatus has been designed and constructed which enables pure cultures to be isolated from fungus-infected wood samples. The sample is inserted into the neck of a sterile vessel containing

some nutrient medium at the bottom, after which a core, cut from the sample by means of a borer, falls on the bottom of the vessel.

1086. MIZUMOTO, S. **[Studies on *Lenzites abietina* Fr. and some of its allied species (IX). On the influence of temperature on the decay of wood blocks attacked by *L. abietina* Fr., *L. subferruginea* Berk., *L. trabea* (Pers.) Fr. and *L. saepiaria* (Wulf.) Fr.]** *J. Jap. For. Soc.* 38 (11), 1956 (437–9). 12 refs. [Jap.jap.e.*e.*]

The best mycelial growth on agar took place for the first fungus at 26–28° C. and for the others at 32–34°. Inoculated on *Pinus densiflora*, *Tsuga sieboldii* and *Abies firma* blocks, maximum decay by *L. abietina* was at 28° and the rest at 32°.

1087. MIZUMOTO, S. **[Studies on *Lenzites abietina* Fr. and some of its allied species. (X). Effect of growth substances upon the mycelial growth of *L. abietina* Fr., *L. subferruginea* Berk., *L. trabea* (Pers.) Fr. and *L. saepiaria* (Wulf.) Fr.]** *J. Jap. For. Soc.* 39 (1), 1957 (28–32). 12 refs. [Jap.jap.e.*e.*]

On synthetic media of sucrose and inorganic salts, the growth of these fungi was poor, but when potato decoction or agar were added, it was good, Thiamine-HCl, biotin, and inositol proved better growth stimulants than pyroxidine-HCl, nicotinic acid and riboflavin. For all fungi, thiamine gave the best growth; the optimum concentration in Czapek's solution was 100γ/1000 c.c. *From author's summary.*

1088. RIGGENBACH, A. ***Fomes lignosus*, a pyrimidine-deficient fungus.** *Nature, Lond.* 180 (4575), 1957 (43–4). 3 refs.

Experiments showed that *F. lignosus* is unable to synthesize the whole thiamine molecule; it can synthesize only one part, thiazole, and the other part, pyrimidine, must be supplied from other sources, e.g. wood, leaves etc.

1089. HARAGUCHI, T. **[Oxidative assimilation of glucose and other substances by the wood-rotting fungus *Polystictus sanguineus*.]** *J. Jap. For. Soc.* 38 (12), 1956 (467–72). 10 refs. [Jap.jap.e.*e.*]

A study, using Warburg's manometric technique for measuring the O consumed, of oxidative assimilation by mycelial pellets, cultured in glucose-peptone with glucose, pyruvate, acetaldehyde, ethyl alcohol, or acetate as respiratory substrates.

1090. BU'LOCK, J. D., JONES, E. R. H., and TURNER, W. B. **Chemistry of the higher fungi. Part VIII. A series of acetylenic compounds from *Polyporus anthracophilus*.** *J. chem. Soc.* April, 1957 (1607–17). O.R.S.

1091. EADES, H. W., and ROFF, J. W. **Red heart stain of Lodgepole Pine logs in the northern interior of British Columbia.** *Mimeo. For. Prod. Lab. Can.* No. *V*1023, 1957. pp. 14. 5 refs.

Specimens of red-stained wood from 306 trees were studied. *Fomes pini* was the causal staining fungus in 50%, and this fungus with *Stereum pini* and *S. sanguinolentum* in 90% of the specimens. *Polyporus anceps* was not found. Branch stubs were the most frequent point of entry. Colour variations for the 3 fungi are described.

1092. SCHEFFER, T. C. **Decay resistance of Western Red Cedar.** *J. For.* 55 (6), 1957 (434–42). 14 refs.

Laboratory decay tests were made of heartwood (h.w.) specimens from 67 trees of *Thuja plicata* grown at different altitudes and on areas from the Pacific coast to points ca. 500 miles inland. Resistance to decay by *Lentinus trabea*, *Fomes subroseus* and *Lentinus lepideus* was uniformly high, but with *Poria incrassata* and *P. monticola* it was variable, 9% of the trees showing only moderate resistance in the outer h.w. This variation did not appear to relate to site or rate of growth; the outer h.w. tended to be more resistant to *P. incrassata* as diam. increased. Within individual trees, resistance increased progressively from the inner to the outer h.w. and from the upper to the lower part of the bole, but the difference was significant only with respect to decay by *Poria* spp. There was limited evidence that maximum radial differences occur where large diam. and resistant outer h.w. are combined. Differences in resistance were frequent among adjacent zones of wood, indicating local irregular distribution of decay-controlling extractives. With few exceptions colour was not indicative of decay resistance. It does not appear practicable to select Red Cedar products for superior decay resistance. Marked losses in resistance to all test fungi except *P. incrassata* were shown for the h.w. of poles that had been in service 21 to 29 years. *From author's summary.*

1093. LINDGREN, R. M., and ERICKSON, E. C. O. **Decay and toughness losses in Southern Pine infected by *Peniophora* [*gigantea*].** *For. Prod. J.* 7 (6), 1957 (201–4). 6 refs.

In exploratory tests, barked Longleaf bolts, stored during summer in Mississippi under conditions resembling commercial practice, showed symptoms of decay attributable to *P. gigantea* in ca. 31, 58, and 62% of the cross-section after respectively 6, 10, and 13 weeks. Corresponding mean losses in sp. gr. were 0·6, 3·2 and 3·5%, and losses in toughness 16, 27 and 33%. Symptoms ranged from slight yellow discolorations in the early stages to softened patches of early wood after 13 weeks, but there were no open pockets.

1094. LUTHARDT, W. Von holzbewohnenden Speisepilzen über die biologische Stubbenrodung bis zum Myko-Holz. **[From cultivation of edible fungi on wood to 'biological stump disposal' and the manufacture of 'Myko-Holz'.]** *Forst u. Jagd* 6 (9; 10), 1056 (429–31; 475–7). 8 refs. [G.]

Includes some information on the manufacture of modified wood for pencils by inoculation with fungi. The temperature in the incubation kilns should be kept at ca. 23° C. [Cf. *F.A* 18 No. 4703.]

845. Attack by Animals

845.1. Marine Borers

1095. CLAPP, W. F., and KENK, R. **Marine borers—a preliminary bibliography.** Technical

Information Division, Library of Congress, Washington, D.C. 1956. pp. ix + 346. P.R.

A selection from literature up to June, 1955, related to engineering rather than to theoretical aspects, with 769 abstracts under the heads: biology, marine-borer attack (classified geographically), and prevention of attack.

1096. CORBET, P. S. **Duration of the aquatic stages of *Povilla adusta* Navás (Ephemeroptera: Polymitarcidae).** *Bull. ent. Res.* 48 (2), 1957 (243–50). 5 refs.

Adults, swarming about the 2nd and 3rd night after full moon, live one hour. The aquatic stages last 4 or 5 months, including 2 weeks in the egg. The wood-boring larvae are well known to E. African boatbuilders as causing serious damage below the waterline. Periodic stomach sampling of the fish *Mormyrus kannume*, which feeds heavily on this species, provided the data on its larval life.

845.2. Terrestrial Borers

See also No. 1067.

1097. HEPBURN, G. A. **The history and control of timber insects in the Union of South Africa.** Government Printer, Pretoria 1957. pp. 10. 4 refs. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

1098. CONNOLA, D. P. *et al.* **Insect damage and its prevention in windthrown saw timber.** *Bulletin, New York State Museum and Science Service, Albany* No. 352, 1956. pp. 36. 9 refs.

The principal species attacking softwoods were *Trypodendron bivittatum*, *Gnathotrichus materiarius*, *Tetropium cinnamopterum*, and two species of *Monochamus*, the last penetrating 4–7 in. into the wood and the others 2–3 in. Hardwoods were attacked by *Xyloterinus politus* and *Monarthrum mali*. Mill studies of 47 salvaged Red Spruce logs showed a direct correlation between insect entry counts on log surface and damage in sawn timber. Fewer borers than ambrosia beetles were needed to damage a given volume. Differences between damage to different tree species were sufficient to make predictions for other species from the Red Spruce data misleading. It proved easier to prevent insect attack than to kill insects after entering. Complete hand spraying of uninfested logs with 12% DDT in kerosene prevented insect attack for over a year. In a mill yard where decks of Yellow Birch logs were kept wet by a water sprinkler to prevent dry rot, there was less attack by *Xylotrechus colonnus* on sprinkled than on unsprinkled logs.

1099. BRANDT, H. *Niphona furcata* Bates (Col. Cerambycidae) in importiertem Bambusrohr. [***N. furcata* in imported Bamboo.**] *Anz. Schädlingsk.* 30 (9), 1957 (153–4). 5 refs. [G.]

Reports the discovery of living larvae of *N. furcata* in imported Bamboo at Munich.

1100. **Anti-woodworm treatments.** *Rep. Fire Res. Bd., Lond. 1956*, 1957 (21–3).

It has become evident in recent years that the *in situ* treatment of timber with anti-woodworm preparations may involve an increased fire hazard that may persist for some time after the application. An investigation, using surfaces of sound quarter-sawn wood, showed that these hazards may persist for periods within the following limits, for two inflammable solvents and an active constituent commonly used in woodworm preparations: white spirit 24–48, kerosene 96–168, *o*-dichlorobenzene 48–72 hours. For infected wood, in which greater penetration of liquid can occur than in sound wood, for wood treated in situations where evaporation is retarded, and for wood with the heavier treatments obtainable by prolonged soaking or pressure, longer drying periods will have to be allowed for the hazards to disappear. Tests on wood treated with 'technical white oil' indicated that the increase in the rate of development of a fire, due to treatment with a preparation in which this solvent predominates, will be less than that due to other solvents and may be of little practical importance.

1101. HADLINGTON, P., and CAMPBELL, K. G. **A method for the control of the house longhorn beetle, *Hylotrupes bajulus* L., in Australia.** *Aust. For.* 20 (2), 1956 (89–95 + 2 plates). 6 refs.

H. bajulus has recently been found active in a timber-framed house 10 miles N. of Sydney. Fumigation was undertaken with MeBr at a rate of 4 lb./1000 cu. ft., and all test insects (*Lyctus brunneus* and *H. bajulus*) placed in the house before fumigation were killed after an exposure period of 24 hours.

1102. FISHER, R. C. **Australian quarantine and wood-boring insects.** Forestry Commission, London. 1957. pp. 9. 5 refs. (Seventh British Commonwealth Forestry Conference, Australian and New Zealand, 1957.)

[Cf. *F.A.* 19 No. 873.] Within the past 5 years Australian quarantine precautions against the importation of wood-boring insects, in particular *Sirex* woodwasps, have been intensified and have raised complex problems in countries supplying Australia with softwoods either as sawn timber, prefabricated houses, or packing cases and crates. A brief account is given of the situation in the U.K. and of an enquiry into the efficacy of fumigation with MeBr as a means of destroying *Sirex* in timber for export. It is concluded that, with present information, this type of treatment applied to bulk-piled sawn timber under commercial conditions in the U.K. cannot be relied on to be completely effective. Alternative methods of treatment are reviewed shortly. Attention is directed to *Hylotrupes bajulus*, recorded recently for the first time in Australia, and the significance of strict quarantine is stressed in relation to infestation by this serious pest of softwood building timbers. *From author's summary.*

845.3. Termites

See also Nos. 58, 1097

1103. ***Cryptotermes brevis* (Wlk.).** *Distr. Maps Insect Pests* (*Ser. A*) No. 77, 1957. pp. [2].

1104. BLEW, J. O. **An international termite exposure test—twenty-second progress report.** *Proc.*

Amer. Wood Pres. Ass. 52, 1956 (272–82). 1 ref. [Cf. *F.A.* 15 No. 870.] P.R.

1105. HETRICK, L. A. **Ten years of testing organic insecticides as soil poisons against the eastern subterranean termite.** *J. econ. Ent.* 50 (3), 1957 (316–7). 1 ref.

Adds 5 years' observations to those already reported [see *F.A.* 14 No. 795]. Very small amounts of BHC have remained toxic for 10 years, and of aldrin, dieldrin, and heptachlor for 7 years, in sandy soil, under the conditions described. Chlordane, DDT, TDE, methoxychlor, toxaphene, PCP, and sodium pentachlorophenate are toxic for 10 years, but larger amounts are required.

1106. **Termites and buildings.** *Information Sheet, West African Building Research Institute, Accra* No. 6, 1956. pp. 4. P.R.

Gives information on protective measures and eradication from infested buildings. A list of timbers which can be expected to be resistant to subterranean termites in West Africa is given in the table.

847. Drying (Seasoning)

See also Nos. 979, 1028–9, 1061.

1107. RICHARDS, E. G. **Loss of weight of small-sized hardwoods due to drying.** *Rep. For. Res. For. Comm., Lond. 1955/56*, 1957 (162–6).

Tentative conclusions drawn from one year's experiments are that small unbarked hardwoods felled in May and stacked in open piles in the forest, lost up to 5% of their green weight one month after felling (a wet period); 5–10% of their green weight 2 months after felling (weather becoming drier in 2nd month); up to 20% of green weight by the end of the summer (an exceptionally dry July, August, and September).

1108. PECK, E. C. **Air drying and sticker staining of 4/4 Sugar Maple flooring stock in Upper Michigan.** *Rep. U.S. For. Prod. Lab., Madison* No. 2086, 1957. pp. 10 + 2 photos, 1 dgm., 2 gphs., 4 tbls. P.R.

Losses (in $ per 1000 bd. ft.) caused by: all drying defects; checking, splitting and warping; wide, green stickers; narrow, dry stickers; drying in open sheds, roofed and roofless piles.

1109. GRAHAM, R. D. **Effect of several drying conditions on strength of coast-type Douglas Fir timbers.** *For. Prod. J.* 7 (7), 1957 (228–33). 7 refs.

The material tested was 4 in. × 8 in. × 10 ft. timber consisting almost entirely of heartwood. Strength properties were affected by high-temperature seasoning, and timbers dried at 202° F. lost ⩾ 15% of their strength. Strength properties were affected in the increasing order: modulus of elasticity, modulus of rupture, work to maximum load. Honeycombing and lowered hygroscopicity were other effects of high temperature. Air-dried timbers were 39% stronger in bending than similar green timbers. An initial drying temperature of 150° F. is suitable for Douglas Fir timbers.

1110. JOHNSTON, D. D. **Effect of mechanical restraint during drying on the subsequent distortion of timber.** *Timb. Technol.* 65 (2219), 1957 (453–5).

The investigation was made in order to find the extent to which distortion of timber can be reduced by imposing mechanical restraint during drying and to examine the behaviour of the timber after the removal of the restraint. It was found that restraint is more effective with Beech than with African Mahogany; that, of the various forms of distortion, 'cup' is the most greatly reduced; and that the effect of restraint is greater at high temperatures than at low. For some time after the restraint has been removed, even without any change in the moisture content of the timber, there is a gradual increase in distortion before a steady shape is assumed. *From author's summary.*

1111. JOHNSTON, D. D. **The kiln drying of home-grown Beech. A comparison between the drying of boards and the drying of dimension stock.** *Timb. Technol.* 64 (2210), 1956 (631–3).

Results of exploratory tests with 1¼-in. boards and curved 37 × 1 × 1-in. dimension stock (for chair legs) show that the latter can be kiln-dried under the conditions of the tests in roughly half the time required to dry boards of the same thickness. For a given kiln size the output of useable dimension stock per unit time is considerably higher when the timber is band-sawn before drying.

1112. STEFAN, A. Uscarea artificială a lemnului de carpen. **[Kiln seasoning of Hornbeam timber.]** *Industr. Lemn.* 6 (2), 1957 (53–6). [Rum.russ.g.]

Air seasoning of large-diameter Hornbeam may take 4–8 years. Experiments in kiln seasoning with alternating hot and cold treatment (schedule given) succeeded in drying 70 × 70 × 1000 mm. timber from 42·5 to 8·3% m.c. in 620 hours without serious degrade.

1113. DUMITRESCU, N. S., ANDRIANO, D., and BOICIUC, M. Cercetări cu privire la elaborarea unor noi regimuri de uscare pentru doagele de stejar şi grinzile de molid de mari dimensiuni. **[Studies with a view to establishing new seasoning schedules for Oak [*Q. robur*] stavewood and large beams of Spruce.]** *Industr. Lemn.* 4 (2), 1955 (58–65). 6 refs. [Rum.]

Data are given in graphs and tables, for schedules for Oak staves of 30–50 mm. thickness and Spruce beams of 130–175 mm.

1114. TERAZAWA, S., and KODAMA, M. **[Fundamental study on the operation of wood drying (II). On the characteristic curve in wood drying (2).]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 93, 1957 (89–96). 1 ref. [Jap.jap.e.*e.*]

Characteristic drying curves [cf. *F.A.* 17 No. 3409] are drawn for *Picea jezoensis*, *Betula maximowicziana*, *Fraxinus mandshurica* and *Shorea* sp. (Red Lauan), and a theoretical wet-bulb-depression schedule derived for each. When these are applied, the smooth theoretical and actual drying curves for each timber are practically coincident. Temperature is held at 60° C. and air velocity at 70 cm./sec. throughout.

1115. TERAZAWA, S., and KODAMA, M. **[Fundamental study on the operation of wood drying. III. A simplified estimation of drying time in kiln drying.]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 97, 1957 (61–72). 10 refs. [Jap.e.*e.*]

Boards 21 mm. thick, of 18 Japanese softwoods and 22 hardwoods, were dried to 10% m.c. undre constant wet- and dry-bulb temperatures of 60 and 35° C. respectively and the value of k in the following general equations tabulated for each. The drying rate, $du/dt = k\,(U_a - U_e)$, and

$$t = \frac{1}{k} \log \frac{U_a - U_e}{U - U_e},$$

where U_a, U_e and U are respectively the initial, final and a given m.c. From a graph the number of days, t, for drying a range of the thicknesses can be read for each species.

1116. STEVENS, W. C., JOHNSTON, D. D., and PRATT, G. H. **An investigation into the effects of air speed on the transference of heat from air to water.** *Timb. Technol.* 64 (2208), 1956 (537–9). 4 refs.

Values of the coefficient of heat transfer from air at 60° C. to water at 50° for mean air speeds ranging from 1½ to 9 ft./sec., have been estimated from the rate of moisture loss from wet Corsican Pine during the period of constant drying rate. The relationship between the heat transfer coefficient and the mean air speed was approximately linear and could be expressed by the equation $h = 1{\cdot}9 + 0{\cdot}48V$, where h is in B.Th.U./sq. ft. hour degrees F. and V is in ft./sec. *From authors' summary.*

1117. STEVENS, W. C., and JOHNSTON, D. D. **Temperature drop across a pile of green timber and its effects on drying rates.** *Timb. Technol.* 65 (2212), 1957 (73–5). 2 refs.

Using the values of the heat transfer coefficient determined by the authors, the effect of air speed on the drop in temperature and drying rate across a pile of wet timber in a kiln was examined theoretically. The advantages to be gained, in the early stages of drying green wood, from a high air velocity and more particularly from reversal of the air flow, were made apparent by this method of analysis. *From authors' summary.*

1118. FREAN, D. H. **A new type of timber kiln.** *Malay. Forester* 20 (3), 1957 (151–2 + 1 photo, 1 dgm).

Describes, with illustrations, an oil-fired batch-drying kiln consisting of a long narrow chamber in which stacks of timber are arranged on pallets. Air circulation is at ca. 80 ft./min. in the empty chamber. Baffles ensure an even spread of the air. The kiln normally dries a charge of 8 tons from 25 to 12% m.c. in about 12 hours.

1119. KREČETOV, I. V., and CAREV, B. S. Transportabel'nye lesosušil'nye ustanovki. [**Portable timber-seasoning plants.**] *Derev. Prom.* 5 (7), 1956 (5–7). [Russ.] P.R.

Illustrated description of the design, construction, operation, and merits of the recommended portable drying kilns (forced-draught, internal-fan type, constructed of sheet iron); the standard size can take the standard stack of 1·85 × 2·6 × 6·5 m.

1120. **Tasman kilns heated by geothermal steam.** *Aust. Timb. J.* 23 (7), 1957 (90 . . . 96).

Describes the installation by the Tasman Pulp and Paper Co. at Kawerau, New Zealand, of 8 steam wells drilled to a depth of some 2000 ft., and producing > 350,000 lb./hour at 150 lb./ sq. in., the partial output of a single well being sufficient to heat kilns for 25 million bd. ft./year and provide for the wood preparation and preservation plants. Extended use through electric power is intended. Notes on other installations for this purpose in New Zealand are included.

1121. TERAZAWA, S., and TUTUMOTO, T. [**A hot-wire anemometer applicable to lumber dry kiln.**] *Bull. For. Exp. Sta. Meguro, Tokyo* No. 97, 1957 (163–73). 2 refs. [Jap.]

1122. VILLIÈRE, A. La haute fréquence et le séchage du bois. [**High frequency and wood drying.**] *Rev. Bois Appl.* 12 (1), 1957 (26–8). 1 ref. [F.]

Presents the results of tests on samples of Beech, Hornbeam, Scots Pine, Oak, and Bang-Lang (*Lagerstroemia* sp.) to ascertain whether H.F. drying of air-dry or kiln-dried (m.c. > 20%) wood down to 8–10% m.c. would result in a uniform moisture distribution and absence of stresses. The samples measured 150 × 150 × 60–70 mm. A 3·2 KV, 3 megacycles/sec. generator was used, the air-gap between electrodes and samples being 8 mm. wide. In Beech and Hornbeam the moisture distribution was found to be fairly uniform. For Scots Pine (high initial m.c. of 42 or 51%) the drying time was probably too short to give uniform moisture distribution. Beech and Hornbeam (but not Scots Pine) showed a minimum of stresses. HF drying was found to be unsuitable for Oak (cracks developed at the outset) and Bang-Lang (effusion of resin). No cracks were observed in Beech, Hornbeam and Pine.

1123. VILLIÈRE, A. **High frequency and wood drying.** *Transl. For. Prod. Lab., Can.* No. 114, 1957. pp. 5. Transl. from *Rev. Bois. Appl.* 12 (1), 1957 (26–8). Limited distribution. P.R.

848. Timberyard Practice. Handling and Storage of Timber

See also No. 1081.

1124. PAELKE, F. W. Transport in holzverarbeitenden Klein- und Mittelbetrieben. [**Transport in small and medium-sized woodworking plants.**] Krausskopf-Verlag, Wiesbaden. 1957. pp. 144. [G.] Price *DM*.9·80. P.R.

Includes sections on: choice of means of conveyance; transport of converted wood; transport of chips; vertical transport; correct stacking; and transport of manufactured units.

1125. SIEBER, K. Mechanisierung des Holztransportes auf Holzplätzen verschiedener Grössen. [**Mechanization of timber transport in timber yards of various sizes.**] Krausskopf-Verlag, Wiesbaden. 1957. pp. 98. [G.] Price *DM*.17·60. P.R.

Includes sections on: timber yards (stacking); transport of logs: transport of tree-length logs.

1126. **Jib crane.** *For. Equipm. Note, FAO* No. *D*.13.57, 1957. pp. 1.

Specification, photograph and plan, of an electric

crane handling loads up to 15 tons, made by R. C. Le Tournean Inc., Longview, Texas.

1127. VINTILĂ, E. Experimentarea procedeului de conservare a buştenilor de fag în timpul verii prin stropire (ploaie artificială). **[Experiments in protection of Beech logs during summer by sprinkling.]** *Industr. Lemn.* 6 (7), 1957 (254–8). 11 refs. [Rum.russ.g.f.e.]

Describes, with illustrations, an experiment in storing Beech veneer logs during the summer with an automatic sprinkler system. Provided that the logs were in a suitable condition to begin with (m.c. $\geqslant 70\%$), the method gave good results, though not as good as storage in a log pond. The cost of installation is much less than that of a log pond.

1128. **Lumber wrapping machine.** *For. Equipm. Note, FAO* No. *D*.12.57, 1957. pp. 2.

A machine made by Pierce Wrapping Machine Co., La Grange Park, Ill., that will wrap lengths of lumber etc. with diameters from 1 to 9 in.

85. Grading of Wood and Wood Products

851. Timber Quality in General

See also No. 420.

1129. KLEM, G. G. Kvalitetsundersøkelser av norsk og tysk gran. **[Quality of Norway Spruce wood of Norwegian and German provenances.]** *Medd. norske Skogforsøksv.* 14 (No. 48), 1957 (285–314). 14 refs. [Nor.nor.e.]

Seven trees of German and 20 of Norwegian provenances from Norway and 23 of German provenance from Denmark were studied. No difference in wood quality was found between the German provenances from Norway and Denmark. German provenances from the same site class and with the same annual-ring width have higher dry density than Norwegian ones, because of their higher late-wood %. There was no difference between the provenances for number of knots in trees of the same taper and stand age. No difference was found in lignin content, ether extract and ash, nor in pulp yield per weight unit, but the pulp yield per volume unit from German Spruce was higher because of its higher density. Drainage time and beating time of German Spruce pulp were shorter, breaking length and bursting strength lower, and tearing strength higher, than in Norwegian Spruce pulp. Conclusions are that the German Spruce will give stronger timber and higher pulp yields, but that, except in tearing strength, the quality of pulp from Norwegian Spruce will be higher. Yield of dry matter is higher and dimensions larger for German Spruce with the same knot content.

852. Detection, Recognition and Assessment of Injuries and Defects

See also Nos. 235, 456, 914–5, 940–1, 976–8, 982, 1033–4, 1053, 1108, 1110, 1144–5.

1130. GHEORGHE, A. B. Influenţa nodurilor asupra calităţii sortimentelor de lemn brut. **[The influence of knots on grading of assortments of wood in the rough.]** *Rev. Pădurilor* 1957 (3), (187–9). [Rum.]

Tabulates data on frequency of different types of defect in Oak, Beech, Spruce and Silver Fir, and allowable proportions of knots for different grades and assortments.

1131. NGOK, W. C. **The effect of latex shakes on the strength of Jelutong (*Dyera costulata*).** *Malay. Forester* 20 (3), 1957 (165 + 2 photos).

Tests on paired specimens showed that static bending strength was 5% less in pieces containing shakes. This loss of strength is small compared with strength variation from other causes (e.g. variation of sp. gr. from pith to bark), and for practical purposes it is negligible as long as the shakes are firmly closed.

1132. NAKAMURA, A., and ABE, H. **[Studies on the prevention of brown stain of Beech wood. (Report 1). On the effect of chemical reagents on the brown stain of Beech wood.]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 98, 1957 (137–42 + 4 photos). 5 refs. [Jap.jap.e.*e*.]

Discoloration (probably due to phenols and enzymes) is prevented by immediate kiln or vacuum drying or air seasoning at 0–5° C. Soaking for 3 days in acetone, in various weak acids or $HgCl_2$, Na_2SiF_6, phenylmercuric acetate, and/or NaCl gave good results, but further confirmation of the first is required.

1133. MCCOY, E. W. **How to minimize the effects of tension wood in Cottonwood.** *Sta. Note Cent. St. For. Exp. Sta.* No. 103, 1957. pp. 2. 4 refs.

Recommendations for reducing losses in *Populus deltoides* caused by tension wood, include: (1) removal in thinnings of all trees with a lean $\geqslant 4°$; (2) marking, during logging, the upper face of trees with such a lean and discarding in the sawmills that portion under the upper face.

1134. **Avoid metal damage with detector.** *B.C. Lumberm.* 41 (7), 1957 (85).

The Söderhamn Metal-Matic detector is remote-controlled, adjustable for sensitivity, and strongly built; it works on 110- or 220-volt, 3-phase current. When a log containing metal passes on the conveyor, a horn or bell is sounded and the affected portion of the log is sprayed with dye. An accessory will stop the conveyor.

1135. BUGLAJ, B. M. O deformacii poverhnosti drevesiny pod meritel'nym davleniem. **[Surface deformation of wood under the pressure of measuring appliances.]** *Derev. Prom.* 5 (8), 1956 (5–9). 4 refs [Russ.] P.R.

Relationships are given between the deformations caused by the feeler-tip of a device for measuring smoothness of surface, and the thrust applied, the wood density, kind of wood (early, late), its moisture content and the diameter of the sphere corresponding to the curvature of the feeler-tip. Thrusts up to 300 g. were applied. The optimum as regards the balance of positive and negative errors was reached when the diameter of the sphere was 4 mm., and the diameter of the rod behind the tip was 1·3 mm.

1136. KOLJO, B. Untersuchungen über den Harzaustritt bei der Holztrocknung. **[Investigations**

on resin bleeding in wood seasoning.] *Holz Roh- u. Werkstoff* 14 (5), 1956 (172–81). 26 refs. [G.g.] P.R.

Describes the method used and the results obtained in the quantitative determination of the resin exuding from Scots Pine heartwood in various directions with regard to the grain, at 40, 60, 80, 100, and 120° C. Changes in the colour of Spruce resin caused by water and oxidation at higher temperatures, were tested photometrically. The softening point of resin, which depends on the proportion of volatile compounds, especially terpenes, was also investigated.

853. Grading of Wood in the Rough

1137. LLOYD, A. H. **The grading of hardwoods in the [British] Commonwealth.** Forestry Commission, London. 1957. pp. 9. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

The greater differences in the weight, structure, hardness, defects and other characteristics of hardwoods compared with softwoods, and the much larger number of marketable hardwood species, will always prevent the adoption of the precise specifications and comprehensive grading rules now applied to softwood sawn timber throughout the world, e.g. stress grading, now being introduced in many countries for sawn softwoods, has only a very limited application to hardwoods, as most of them are too heavy for general constructional use. Some of the existing grading rules for hardwoods are briefly reviewed to show their endless variety and the impossibility of providing a single set of general grading rules applicable to the whole Commonwealth. The present tendency appears to be more individual grading for particular uses or purposes, as efficient and economical grading is only possible when the ultimate use of the timber is known. The issue of standard specifications for individual uses is becoming very common, particularly for home markets, but this cannot be made generally applicable to the export of logs and the larger dimension stock. Grading by the 'clear cutting' system originated in the softwood trade and its value in hardwood grading appears to be very limited; where it is used, the grading rules are usually supplemented with a classification of permissible minor defects. It can only be efficiently applied when the end use of the timber is known.

854. Grading of Converted Timber

See also No. 1137.

1138. BUGGE, O. J. **Grading of green, rotary cut Douglas Fir and other western softwood veneers.** *For. Prod. J.* 7 (7), 1957 (25*A*–27*A*).

Gives tentative grading rules now being used by several manufacturers.

86. Pulp Industries. Composite Materials made Wholly or Partly of Woody Matter. Chemical Utilization of Wood

1139. WATT, A. **Developments in pulping and board manufacture in Great Britain.** Forestry Commission, London. 1957. pp. 5. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

1140. WYCK, J. H. VAN. **The fibreboard, particle board and pulp industries in South Africa.** Government Printer, Pretoria. 1957. pp. 4. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

861. Pulp and Paper Manufacture. Textile and Other Cellulose Derivatives

See also Nos. 155–6, 785–6, 851, 908, 1129, 1139–40, 1206.

1141. L'industria della cellulosa e della carta nell'Angola e nel Mozambico. [**The pulp and paper industry in Angola and Mozambique.**] *Cellulosa e Carta* 8 (7), 1957 (17–9). [It.]

A note on consumption and imports in these colonies, projects for setting up manufacture, and possible raw materials.

1142. CHANDLER, W. G. **The role of the pulpwood industry in forest utilization and management.** Australian Paper Manufacturers Forests Proprietary Ltd., Melbourne. 1957. pp. 12. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

Discusses the beneficial effects for forestry of the increasing use of thinnings, logging waste, and small trees as pulpwood. [Cf. *F.A.* 19 No. 851.]

1143. MACKNEY, A. W., and NEUBAUER, L. G. **The pulping of *Pinus radiata* and the production of paper and board.** New Zealand Forest Service, Wellington. 1957. pp. 10. 5 refs. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

Indicates the changes in the properties of the wood with age, and the effects on pulp and paper properties.

1144. **Pulping of compression wood.** *Rep. For. Prod. Aust. 1956/57*, 1957 (8).

Both sulphate and sulphite pulps prepared from compression wood of *Pinus radiata* were inferior in yield and strength to those made from normal wood. With sulphate pulping, however, the reduction in strength was not serious even when 50 : 50 blends with ordinary pulp were tested. The sulphite method is unsuitable, mainly because of the occurrence of 'acid-susceptible' wood in association with compression wood. [Cf. *F.A.* 18 Nos. 2268, 4745.]

1145. WATSON, A. J. **Pulping characteristics of Eucalypt tension wood.** *Proc. Aust. Pulp Pap. Ind. tech. Ass.* 10, 1956 (43–59). 12 refs.

1146. ADAMIK, K., and BRAUNS, F. E. ***Ailanthus glandulosa* [*altissima*] (Tree of Heaven) as a pulpwood. Part II.** *Tappi* 40 (7), 1957 (522–7). 7 refs. P.R.

[Cf. *F.A.* 17 No. 2205.] Gives information on planting, tending, and the chemical composition of the wood, and presents morphological investigations, sample cooks and physical evaluations of handsheets. The wood has a low lignin content, is easily cooked and bleached, and gives high yields and high strength properties.

1147. FINKEL, M. Incercări de fabricare a mucavalei din coaja rămasă de la extracţia tananţilor. **[The use of tannin-extracted [Spruce and Oak] bark for the manufacture of cardboard.]** *Industr. Lemn.* 4 (6), 1955 (237–41). 7 refs. [Rum.russ.]

Experiments in pulping these residues showed that they were unsuitable for paper-making, but that up to 25% of bark pulp can be used in the manufacture of cardboard, at a saving of 14% in costs.

1148. QUICK, R. H. **Neutral sulfite semi-chemical pulping of Alder [*Alnus rubra*].** *For. Prod. J.* 7 (7), 1957 (246–7). 4 refs.

Describes the method now being used by the Weyerhaeuser Timber Company for pulping Red Alder. The pulp is used for making corrugated paper.

1149. KATZ, S. Obţinerea pastei chimico-mecanice din lemn de fag. **[Semichemical pulping of Beech wood.]** *Industr. Lemn.* 5 (5), 1956 (221–5). [Rum.russ.g.]

Results of laboratory tests (tabulated) indicate that semichemical Beech pulps are of a quality that would provide a substitute for bleached groundwood conifer pulps.

1150. DORLAND, R. M., LEASK, F. A., and MCKINNEY, J. W. **Laboratory studies in sulphite pulping: the effect of species, base, and liquor penetration.** *Pulp Paper Mag. Can.* 58 (6), 1957 (135–45). 23 refs.

Compares and discusses the yield, characters etc., of pulps prepared from chips of (1) 'mill Spruce' ([Black?] Spruce plus Balsam Fir), (2) Black Spruce, (3) Jack Pine, and (4) mixtures of (1) or (2) with (3), sulphite-cooked with NH_4, Na, or Ca bases after facilitation of penetration by steaming, pickling, pressurized digester, Vapurge, Vapress or vacuum.

1151. SADLER, H., and TRANTINA, O. Über die Herstellung von Eukalyptuszellstoff nach dem Sulfitverfahren. **[Manufacture of Eucalypt pulp by the sulphite method.]** *Holzforsch. u. Holzverwert., Wien* 9 (3), 1957 (37–45). 28 refs. [G.g.e.] P.R.

1152. BHAT, R. V., and SINGH, M. M. **Viscose rayon pulp from Blue Gum (*Eucalyptus globulus* Labill.) by water-prehydrolysis sulphate process.** *Indian For.* 83 (6), 1957 (379–83). 8 refs.

Satisfactory viscose rayon pulp was produced by this process from Blue Gum grown in the Nilgiris.

862. Composite Materials made Wholly or Partly of Woody Matter

See also Nos. 785, 876, 1139–40, 1204.

1153. **Annual board review.** *Lumberm.* 84 (6), 1957 (35 . . . 70, 96, 148).

Includes 22 articles reviewing the present and future for insulating, hard-, particle- and flake-boards, with description of manufacture and working methods in 3 plants, notes on the 1957 hardboard conference at Geneva, data on world production, a directory of U.S. board plants and illustrations of uses.

1154. RITTER, E. J. Verbundplatten aus Holzwerkstoffen mit Kunstschichtstoffoberflächen. **[Boards made from chipboard or fibreboard faced with laminated plastics.]** *Holz Roh- u. Werkstoff* 15 (1), 1957 (62–7). [G.g.e.] P.R.

Describes 3 methods of facing chipboards and fibreboards with synthetic materials, viz.: (1) the three-stage method, in which specially prepared facings made from synthetic materials are glued on to the boards; (2) the two-stage method, in which the boards are pressed together with layers of paper impregnated with synthetic materials, resulting in hardening of the synthetic materials and bonding of the board, and (3) the single-stage method, in which moulding of the boards and hardening of the layer of synthetic-material is done in a single process. The facing consists of an outer layer (thin cellulose paper impregnated with melamine resin), a middle layer (paper with colour and pattern, impregnated with a cheaper plastic), and an inner layer (paper impregnated with phenol resin).

1155. **Particle boards.** *Rep. For. Dep. Sarawak 1956*, 1957 (22–3).

Samples of Sarawak woods were sent to Germany to be tested for their suitability for the manufacture of particle board. Samples of *Shorea albida* included (*a*) varying weight and hardness, as these properties are very variable in the species, (*b*) brittle heart, a very common defect, and (*c*) samples immersed in tidal water for 36 hours. Good single and 3-layer boards, both plain and decorative, were produced from all samples, but (*b*) should be used only in admixture with sound wood. The effect of (*c*) was negligible. Samples of 7 of the commonest species occurring in very poor *kerangas* forest (on poor podzolized sandy soils) were also tested. These included: (1) light to moderately heavy woods—Meranti (*Shorea* sp.), Keruing (*Dipterocarpus* sp.), Bintangor (*Calophyllum* sp.) and Sempilor (*Dacrydium elatum*), and (2) very hard, heavy woods—*Cotylelobium flavum*, *Casuarina sumatrana*, and *Whiteodendron moultonianum*. The woods of (1), used in mixture, produced very good boards. Woods of (2) gave some trouble in breaking down, and boards made from them alone were rather weak. Using them in admixture with the lighter species, however, provided excellent boards.

1156. KOLLMANN, F. Über den Einfluss von Feuchtigkeitsunterschieden im Spangut vor dem Verpressen auf die Eigenschaften von Holzspanplatten. **[Effect of moisture differences in chips, before pressing, on the properties of chipboards.]** *Holz Roh- u. Werkstoff* 15 (1), 1957 (35–44). 11 refs. [G.g.e.] P.R.

Presents the results of an investigation on the effect of increased moisture content in the outer-layer chips on the pressing process and the properties of the finished boards. The m.c. was increased by (*a*) spraying the pre-pressed boards just before hot pressing, or (*b*) suitable conditioning of chips for outer layers. During pressing, the additional moisture accelerates the rise of temperature in the interior of the board; at the same time, the greater plasticity of the humidified chips increases the

density of the outer layers and improves the bending and tensile strength and smoothness. There is an optimum value of m.c. of chips, beyond which the quality coefficients fall rapidly. Conditioning of chips was found to be more favourable in practice than spraying.

1157. MAKU, T., and SASAKI, H. **Some factors which affect the swelling properties of chipboard.** *Comp. Wood* 3 (5/6), 1956 (135–9). 3 refs. P.R.

Presents the results of a study showing that: (1) heat treatment of the chips increases the rate of water absorption (w.a.) and swelling (s.), it usually affects but little (and then reduces rather than increases) the absorption of moisture (a.m.), and decreases bending strength (b.s.); (2) a lower molar formaldehyde/urea ratio increases s., decreases a.m., and decreases b.s.; (3) addition of paraffin emulsion decreases w.a. markedly.

1158. ODOM, J. J., and GULLEDGE, E. L. **Particle board's variation of moisture resistance characteristics with type [of] binder used.** *Wood-Worker, Indianap.* 76 (2), 1957 (8–9, 22–3). P.R.

Eight different synthetic-resin glue mixes (three each of phenol-formaldehyde and urea-formaldehyde, and one each of amine-aldehyde and resorcinol formaldehyde) were used in proportions of 5, 7·5 and 10% to make chipboards. Tables present results of tests showing the calculated volatile content before pressing, bulk density, water absorption after 2 (and 24) hours' immersion at 77° F., % immersion thickness (swelling) after 24-hours' immersion at 77°, and time of immersion in boiling water before disintegration. Good particle boards were obtained with all glues at rates of 5 and 7·5% of resin solids; amine-aldehyde when present at the 10% rate caused blowing in the press, owing to the excess of water introduced. Phenol-formaldehyde and resorcinol-formaldehyde types gave excellent resistance in tests involving exposure to moisture.

1159. BRUSQUINI, P. F. **Chipboard, the superior plywood-core material.** *Pap. Amer. Soc. mech. Engrs.* No. 57-*WDI*-5, 1957. pp. 4. P.R.

Describes the platen-press manufacture of chipboards, the types of wood used, the blending of materials, pressing operations, characteristics of the product, and the merits of chipboard as plywood core material.

1160. GOLBS, H., and FENZAHN, F. Die Verarbeitung der Holzspanplatte im Möbelbau. **[Processing of chipboards in furniture construction.]** *Holz Roh- u. Werkstoff* 14 (2), 1956 (68–74). 5 refs. [G.g.] P.R.

Chipboards for furniture should be 17–25 mm. thick. The basic principles of mechanical working with chipboards are given. Edges, which are the most liable to damage, should be protected by glued-on elements. Processing machines can be the same as in woodworking, but the tools should have hardened tips. Dowels are important as a means of joining the chipboards.

1161. BENDER, F., and KING, F. W. **Production of wallboard from wood waste.** *Bull. For. Br. Can.* No. 120, 1957. pp. 43. 9 refs.

Contains general and specific information on wallboard research work of the Forest Products Laboratories of Canada, together with a considerable amount of data on the various types of board and their uses, and machinery and equipment suitable for the manufacture of various types of board from sawmill and other wood residues.

1162. HELGE, K. Anvendelse av sagflis som råstoff til wallboard. **[Use of sawdust as raw material for wallboard.]** *Norsk Skogind.* 11 (4), 1957 (124–30). 4 refs. [Nor.e.] P.R.

Results of experiments showed that when sawdust and shavings from a frame saw were defibrated by any of 3 methods tested, up to 20% of the normal raw material could be replaced by this material. Defibration in an Asplund defibrator with ordinary chips gave the best results.

1163. ANDERSON, A. B. **The influence of some Scandinavian barks on hardboard properties.** *Norsk Skogind.* 11 (5), 1957 (175–9). 9 refs. [E.nor.] P.R.

Preliminary laboratory experiments indicate that both Spruce and Pine barks can be added in considerable amounts (25%–50%) in making hardboards. The use of 50% of Pine bark produced an acceptable board without either sizing agent or heat treatment, and a smaller quantity of bark with heat treatment could be used without sizing. Both heat and sizing are necessary with Spruce. Birch bark did not produce an acceptable board.

1164. **The 4th FIDOR conference.** *Wood* 22 (7), 1957 (300–3).

Extracts from the following papers read at the Fibre Building Board Development Organization's conference, Baden-Baden: Fire problem in relation to the fibreboard industry (*E. P. Lawrence*); Fibreboard and fire risk (*E. Bird*); Designation and standards: [*a*] exterior use of hardboard (*C. Ford*); [*b*] super hardboard (*C. V. Creffield*).

1165. PACKMAN, D. F. **The production of hardboard from tropical hardwoods.** Forestry Commission, London. 1957. pp. 18. 3 refs. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

Hardboards conforming to British Standard 1142 were made on an experimental scale from five tropical hardwoods [*Mora gonggrijpii*, *Koompassia malaccensis*, *Shorea leprosula*, *S. laevis*, and *Dipterocarpus crinitus*] with densities ranging from medium to high. Two processes were employed: (1) mild chemical treatment with neutral sulphite liquors followed by defibration in a disc mill, and (2) treatment with steam alone in a laboratory model Asplund Defibrator. Marked differences in behaviour between the various species were observed during treatment by either process, which had a considerable effect on the properties of strength and water absorption in the boards. While satisfactory boards were produced from some of the woods by both processes, the more difficult species responded better to (1). Several methods were tested to overcome the disadvantage of high water absorption inherent in boards from certain species. Either oil tempering or a combined treatment with

wax and synthetic resin gave satisfactory results in this direction. *From author's summary.*

1166. BRUK, A. C. Novaja ksilenol'naja smola, primenjaemaja pri propitke drevesnovoloknistyh plit dlja polov. **[A new xylenol resin used for the impregnation of flooring fibreboards.]** *Bjulleten' Stroiteljnoj Tehniki* 13 (12), 1956 (15–6). [Russ.] From *abstr.* in *Prehl. lesn. Lit.* 8 (3), 1957 (No. 893). [Slovak.] P.R.

The xylenol-formaldehyde KS resin (resol type), the preparation of which is described, provides a good substitute for phenol-formaldehyde resin in the impregnation of flooring fibreboards, and its use effects 11% reduction in costs.

1167. JOHANSSON, E. Beitrag zur Quellungsvergütung von Holzfaserplatten. **[Improvement of the resistance to swelling in fibreboards.]** *Holz Roh- u. Werkstoff* 15 (1), 1957 (9–11). 3 refs. [G.g.e.] P.R.

By adding ½–1% by weight of suitable [unspecified] moisture-repellent chemicals to the chips, before or during defibration, the hygroscopicity of the wood fibres, and therefore also the water sorption and swelling, can be reduced. Still further improvement in this respect can be obtained by coating the fibres with a tall-oil product, 'tall wax', emulsified e.g. in ca. 0·6% NH_3 solution. This treatment can be used instead of heat-hardening the boards.

1168. LUNDGREN, S. Å. **Conditioning fibreboard before use.** *Timb. Technol.* 65 (2215), 1957 (243–5).

Deals with the conditioning of hardboard (damping and stacking), the effect of damping on joinery, and the conditioning of insulation board. Methods of avoiding shrinkage and buckling in hardboards are listed, and some results of tests sponsored by the Swedish Wallboard Association are discussed.

1169. MARK, H. **Radiation chemistry and wood.** *Comp. Wood* 4 (1/2), 1957 (1–8). 85 refs. P.R.

Outlines the fundamentals of radiation chemistry. It is expected that experiments now in progress to 'graft' layers of styrene and methyl methacrylate on to fibreboards will open up a very promising field for similar research on wood and wood products.

863. Wood Hydrolysis. Saccharification

1170. ODINCOVS, P. N., KALNIŅŠ, A., and BEINARTS, I. **Destructive action of small amounts of concentrated H_2SO_4 on wood substance.** *Latvijas PSR Zinātņu Akademijas Vēstis, Riga* 1956 (11), (83–5). [Russ.] From *abstr.* in *Chem. Abstr.* 51 (14), 1957 (10898). P.R.

Fir [Scots Pine?] wood was treated for 1–2 hours at 40° C. in a vibrating mill with 75% H_2SO_4 (ratio wood/monohydrate = 1/0·3), and the resulting semi-dry mass was heated for 0·5–1 hours to 75°. Almost quantitative hydrolysis resulted, indicating that mechanical treatment greatly promotes hydrolytic destruction.

865. Plastics

1171. PEČATNIKOV, M. I. Proizvodstvo pressovannyh vkladyšej iz drevesnoj kroški. **[Manufacture of pressed bushings from wood chips.]** *Derev.Prom.* 5 (5), 1956 (25–6). [Russ.] P.R.

Birch veneer waste 0·55 mm. thick is reduced to chips 6–8 × 0·3–3 mm.; these are impregnated with phenol-formaldehyde resin and dried to 6–8% m.c. (resin content 18–20%), after which they are moulded at 150–158° C. and 450–500 kg./sq. cm. to form bushings for bearings of tramway electric motors. With a maximum permissible load of 29 kg./sq. cm. at peripheral speed of 1·8–2·0 m./sec., the bushings provide a very large margin of safety and are not inferior to conventional bronze bushings.

866. Utilization of Wood Extractives

1172. SINGH, T., PAUL, V., and HANDA, H. L. **Quality of *Acacia catechu* (Khair) growing in Jammu and Kashmir State.** *Indian For.* 83 (8), 1957 (512–3).

Gives the results of analysis (total solubles, catechin %, catechutannic acid %) of a number of samples from this state.

1173. SEIN BWA, U. **Study on the manufacture of cutch and 'katha' [from *Acacia catechu*] in India under the technical co-operation scheme of the Colombo plan.** *Burmese For.* 6 (2), 1957 (188–99 + 2 plates).

867. Destructive Distillation

See also No. 979.

1174. BERGSTRÖM, H. **Wood chemistry research at Kolningslaboratoriet. Part 3. Destructive distillation, spontaneous ignition and distillation in column apparatus.** *Svensk PappTidn.* 60 (4), 1957 (115–23). 45 refs. [E.e.sw.g.] P.R.

1175. WITHEROW, B. M., and SMITH, W. R. **Cost of operation for 3 types of charcoal kilns.** *Sta. Pap. Stheast. For. Exp. Sta.* No. 79, 1957. pp. 16. 2 refs.

Compares portable sheet-metal kilns of ½- and 1½-cord capacity (*a*) and (*b*), and a double-wall masonry block structure for 2 cords (*c*), describing operations, temperatures, and output, using chiefly air-seasoned wood of the Red Oak group. Total labour cost varied little. Yield was highest, and depreciation cost lowest, with (*c*) but to show a safe profit mechanization of wood handling, larger or multiple kilns, and cheaper wood (e.g. culls) would be required.

89. Other ('Minor') Forest Products

892. Vegetable Products

892.1. Grass. Litter. Leaf Fodder etc.

1176. VUKAVIĆ, D. V., and MAKSIMOVIĆ, D. Prilog poznavanju svarljivosti i hranljive vrednosti hrastovog i jasenovog lisnika. **[The digestive and nutritive qualities of Oak and Ash leaf fodder.]** *Arhiv za Poljoprivredne Nauke, Beograd* 9 (26), 1956 (59–76). 24 refs. [Serb.serb.g.*g.*] A.P.B.

Chemical analysis of leaf fodder of *Fraxinus ornus*, *Quercus lanuginosa*, *Q. sessiliflora* and *Q. cerris*, showed that nutrient value was related to the season of lopping; the nutrient content was higher

earlier in the growing season. Although Oak leaf fodder has more raw protein, Ash is more easily digested and is preferred by cattle. In nutrient value Oak and Ash are intermediate between good and bad (meadow) hay, but are poor in digestible proteins.

1177. GHORI, Y. M. **A short note on the outturn of Babul (*Acacia arabica*) and Kandi (*Prosopis spicigera*) pods in lower zone of Hyderabad Circle forests.** *Pakistan J. For.* 7 (2), 1957 (154–6).

892.4. Bark Products. Tanstuffs. Cork

See also Nos. 918, 1147, 1163, 1201.

1178. MARIAN, J. E., and WISSING, A. **The utilization of bark. Part 1. Index to bark literature (continued).** *Svensk PappTidn.* 60 (11 ; 14), 1957 (420–4; 522–3). [E.] P.R.

The utilization of tannins for water treatment, dyes and mordants, and miscellaneous uses; isolation and utilization of substances other than tannins from bark; bark and water pollution; list of contents. [Cf. *F.A.* 18 No. 4771.]

1179. HUMPHREYS, F. R., and MARTIN, P. J. **A survey of the tannin content of the bark of plantation-grown *Pinus radiata* from Jenolan State Forest, N.S.W.** *Aust. For.* 20 (2), 1956 (96–101). 2 refs.

Samples were taken from thinnings and therefore consisted largely of smooth, young bark, so that values may be regarded as low, but butt bark was found to have a reasonably high tannin content (mean 16%). Tannin content was unaffected by site quality, and varied inversely as the height of the bark from the ground.

1180. RAUD, G. Observations sur les tanins de la bogue du châtaignier (*Castanea vulgaris* L.). [**The tannins in the husk of *C. sativa*.**] *C. R. Acad. Sci., Paris* 244 (22), 1957 (2734–6). 2 refs. [F.f.] O.R.S.

1181. RAO, J. B., NAYUDAMMA, Y., and DAS, B. M. **Survey of the indigenous tanning materials of the Madras State. II. *Hopea parviflora*.** *Bulletin, Central Leather Research Institute, Madras* 1 (3), 1954 (5). From *abstr.* in *J. Soc. Leath. Tr. Chem.* 39 (6), 1955 (204). O.R.S.

Analyses and tanning trials showed that *H. parviflora* is a suitable substitute for imported wattle. [Cf. *F.A.* 16 No. 4789.]

1182. DAS, B. M., and RAO, J. B. **Wattle bark substitutes (Indian).** *Journal, Leather Tech. Association* 3, 1955 (4). From *abstr.* in *J. Soc. Leath. Tr. Chem.* 39 (6), 1955 (195). O.R.S.

A mixture of *Acacia leucophloea* and *Cassia auriculata* or *C. marginata* barks, or *Hopea parviflora* alone, are suggested.

1183. RAO, J. B., NAYUDAMMA, Y., and DAS, B. M. **Survey of the indigenous tanning materials of the Madras State. III. *Cassia marginata*.** *Bulletin, Central Leather Research Institute, Madras* 2, 1955 (4). From *abstr.* in *J. Soc. Leath. Tr. Chem.* 40 (6), 1956 (208). O.R.S.

Results were equal to or better than those with other tanstuffs, e.g. Mimosa, Avaram [*Cassia auriculata*] or Goran [*Ceriops roxburghiana*].

1184. BURTON, D., and BARAT, S. K. **Vegetable tanning. X. The properties of Avaram bark (*Cassia auriculata*), Konnam bark (*Cassia fistula*) and Goran bark (*Ceriops roxburghiana*).** *J. Soc. Leath. Tr. Chem.* 39 (6), 1955 (184–94). 48 refs. O.R.S.

[Cf. *F.A.* 16 No. 2485.] Chemistry and tanning properties.

1185. KHALIQUE, M. A., and AHMED, M.-D. **Indigenous tanning materials of E. Pakistan. Part II. Goran as a tanning material.** *J. Soc. Leath. Tr. Chem.* 39 (5), 1955 (150–2). 5 refs. O.R.S.

[Cf. *F.A.* 17 No. 4584.] Physical and chemical analyses of leathers produced by extracts of *Ceriops roxburghiana* are presented. These leathers compared favourably with one tanned with Wattle-bark extract.

1186. RAHMAN, M. B., KHAN, A. A., and IMAM, S. M. **Sulphiting of Goran [*Ceriops roxburghiana*) bark tannins.** *Pakistan J. For.* 7 (2), 1957 (145–50). 4 refs.

Experiments have shown that sulphiting during extraction considerably increases the yield of soluble tannins and also improves the colour of the extracts.

1187. SCARIA, K. J., BARAT, S. K., and DAS, B. M. **Nature of the tannins in *Terminalia chebula*.** *Bulletin of the Central Leather Research Institute, Madras* 3, 1956 (70–5). From *abstr.* in *Chem. Abstr.* 51 (6), 1957 (4745). P.R.

1188. FAHEY, M. D., and KURTH, E. F. **The chemical nature of the phenolic acid in the cork from White Fir bark.** *Tappi* 40 (7), 1957 (506–12). 20 refs. P.R.

The phenolic acid material obtained by alkaline saponification of the cork from *Abies concolor* was shown to be chemically analogous to the phenolic acids isolated from bark of other conifers.

1189. HATA, K., and SOGO, M. [**Chemical studies on bark. I: Chemical composition and some chemical properties of the bark of Japanese Red Pine (*Pinus densiflora*). II: On the extractives, especially the wax, from the outer bark of Japanese Red Pine (*P. densiflora*).**] *J. Jap. For. Soc.* 38 (12), 1956 (473–8); 39 (3), 1957 (102–6). 29 refs. [Jap. jap.e.*e.*]

(1) Investigates the NaOH and hot-water extractives of the outer and inner bark, leaves and sapwood, the solubility of bark lignin in NaOH and the ultra-violet absorption spectra of the purified tannin (catechol tannin II) and phlobaphene. (2) The outer bark was extracted with hexane, benzene, ether, ethanol, and hot water. Analysis of the benzene-soluble wax, showed that its main constituents were lignoceryl acid (54·2%) and lignoceryl alcohol (11·6%). Data are also given for other constituents of the wax and those of extractive-free bark.

1190. BROWNING, B. L., and SELL, L. O. **The analysis of some fractions of Slash Pine bark.** *Tappi* 40 (5), 1957 (362–5). 12 refs. P.R.

Presents the results of elementary and functional-group organic analysis of *Pinus elliottii* bark, and of

its 5 fractions (substances soluble in successively applied C_6H_6, hot water, 1% NaOH at 90° C., 4% NaOH at 170° and the residue). The methods used are described. The data were evaluated by calculating the 'oxygen balance', i.e. the sum of O attributable to determined functional groups and to sugars was compared with the total O shown by elementary analysis.

1191. RASTOGI, R. P., and DHAR, M. L. **Studies in the chemical composition of *Ailanthus malabarica* DC.** *J. sci. industr. Res., India* 16*B* (2), 1957 (74–80). 9 refs. D.S.I.R.

Malanthin, a crystalline steroid ($C_{21}H_{30}O_4$), has been isolated from bark of *A. malabarica*. A tentative partial structure has been assigned to it on the basis of its ultra-violet and infra-red absorption spectra and other data. *From authors' summary.*

892.5. Medicinal Plants, Edible Plants, Insecticides from Plants, etc.

See also No. 370.

1192. JANKŮ, I., HÁVA, M., and MOTL, D. Ein diuretisch wirksamer Stoff aus Wacholder (*Juniperus communis* L.). [**A diuretic from *J. communis*.**] *Experientia, Basle* 13 (6), 1957 (255–6). 3 refs. [G.e.] O.R.S.

Terpinenol-4, from the oil of Juniper berries, was found to have a marked diuretic effect. *From authors' summary.*

1193. KIDD, D. A. A. **Alkaloids of Rauwolfia species: preliminary studies on *Rauwolfia cambodiana*.** *Chem. & Ind.* 1957 (29), (1013). 8 refs. P.R.

1194. WHITE, E. P. **Alkaloids of the Leguminosae. Part XXVI: Examination of further legumes, mainly *Lupinus* and *Acacia* species for alkaloids.** *N.Z. J. Sci. Technol.* 38*B* (7), 1957 (718–25). 12 refs. P.R.

Tryptamine, usually with β-phenylethylamine, was found in 4 more species of *Acacia*; β-phenylethylamine alone in 2 more species; and *N*-methyl-β-phenylethylamine with β-phenylethylamine in 2 more species. *From author's summary.*

1195. DULL, G. G. **The investigation of certain antibacterials in *Populus tacamahaca* Mill. and *Hypericum prolificum*.** *Abstr. of thesis*, in *Dissert. Abstr.* 17 (7), 1957 (1453). O.R.S.

Two sesquiterpene alcohols isolated from the buds of *P. tacamahaca* showed activity *in vitro* against *Mycobacterium tuberculosis.*

892.6. Resin and Turpentine. Essential Oils. Fixed Oils and Fats. Gums. Latex. Dyestuffs. Sap Sugar

See also Nos.102–3.

1196. BARDYŠEV, I. I., UHOVA, L. I., and ČERČES, H. A. **Composition of the turpentine from the Siberian Larch.** *Vesci Akademii Navuk Belaruskaj S.S.R., Ser. fiz.-teh. Navuk* 1956 (1), (125–6). [Russ.?] From *abstr.* in *Chem. Abstr.* 51 (4), 1957 (3159). P.R.

Steam distillation produced from the crude resin of *Larix sibirica*, containing 80·5% rosin and 17·6% turpentine, a turpentine sample with the characteristics: n_D^{20} 1·4728, α_d — 26·43°, d_{20}^{20} 0·8628 g./c.c. Boiling-point, density, refractive index and optical rotation are tabulated of 31 fractions obtained by fractional distillation of turpentine, in which *l*-α-pinene, *l*-β-pinene, and *d*-△³-carene were identified.

1197. BARDYŠEV, I. I., KOHOMSKAJA, V. V., and UHOVA, L. I. Neoabietinovaja kislota—pervičnaja kislota živicy sosny obyknovennoj. [**Neo-abietic acid—a primary acid of *Pinus sylvestris* resin.**] *Dokl. Akad. Nauk SSSR* 112 (4), 1957 (653–4). 5 refs. [Russ.] A.P.B.

Two specimens of neo-abietic acid were isolated from the resin of *P. sylvestris*; they had higher values for m.p. and optical rotation than those given in the literature.

1198. ABE, M. *et al.* [**Studies on natural resins III. Chemical properties of Pine oleoresins of Akamatsu (*Pinus densiflora*) turpentined by sulfuric acid treatments.**] *Bull. For. Exp. Sta. Meguro, Tokyo* No. 95, 1957 (157–80). 42 refs. [Jap.jap.e.*e.*]

Analytical and physical data are given for the crude and pure oleoresins, the turpentine oils and the resin acids of first- and second-year tappings by the Japanese, American and bark-chipping methods, treated with 30, 40 or 50% H_2SO_4, and freshened every 7 or 6 days. The effect of the acid treatment on these properties is discussed in detail. [Cf. *F.A.* 19 No. 458.]

1199. TORNER OCHOA, J. El eucaliptol en el sur de España. [**Cineole in the south of Spain.**] *Montes, Madrid* 13 (75), 1957 (191–9). 16 refs. [Span.]

Analyses were made of 29 samples taken from *Eucalyptus globulus* at different times of year. One practical conclusion was reached, that the cineole content is lowered during March and August. The experiments are to be continued.

1200. SADGOPAL. **Development of essential oils industry in India and Pakistan.** *Indian For.* 83 (6), 1957 (355–67 + 7 photos). 15 refs. (*Repr.* from *Industries de la Parfumerie, Paris* Dec. 1956.)

1201. MITRA C. ***Calophyllum inophyllum* Linn.: Part I.—Chemical constituents of the nut oil and the stem bark. Part II.—Constitution of inophyllic acid.** *J. Sci. industr. Res. India* 16*B* (3; 4), 1957 (120–4; 167–72). 37 refs. D.S.I.R.

1202. MARKLEY, K. S. **Fat and oil resources and industry of Brazil.** *Econ. Bot.* 11 (2), 1957 (91–125). 1 ref.

Includes a review of natural sources of vegetable oils and fats, including the fruit and nuts of several tree species, and discusses their exploitation.

1203. PATHAK, S. P., and DEY, L. M. **Fatty acids of the seed fat of *Pongamia glabra*.** *J. chem. Soc.* April, 1957 (1917). O.R.S.

892.7. Fruits. Seeds. Fibres, Yarns and Flosses

1204. BARUAH, H. K., RAGHAVAN, V., and MURTHY, K. N. **Investigations on the utilization of byproducts of areca nut (*Areca catechu* Linn.).** *J. sci. industr. Res., India* 16*C* (4), 1957 (89–95). 17 refs. D.S.I.R.

The main areca-nut cell-wall constituents are pectin, protopectin, hemicellulose, cellulose and lignin in proportions varying with the maturity of the husk. Methods are described for the preparation of hardboards from husk fibres.

1205. LODER, J. W. *et al.* **Diospyrol, a constituent of *Diospyros mollis*.** *J. chem. Soc.* May, 1957 (2233–7). 10 refs. O.R.S.

The principal constituent of the fruit of *D. mollis* is a 2 : 2′-dinaphthyl, closely related to gossypol.

892.8. Heather. Broom etc. Osiers. Canes and Bamboos. Reeds and Rushes. Thatching Materials

1206. HODGE, W. H. **Bamboos, their economic future in America.** *Gdn. J. N.Y. bot. Gdn.* 7 (4), 1957 (124–8, 131). 1 ref.

A general note on the introduction and use of Bamboos in the U.S.A., and on research in progress there on their utilization. The yield/acre/year of cellulosic material is 6 times that of Southern Pine, and some species yield regularly on a 5-year cycle.

9. FORESTS AND FORESTRY FROM THE NATIONAL POINT OF VIEW. SOCIAL ECONOMICS OF FORESTRY

90. General

902. History of Forests and Forestry

See also Nos. 861, 1244.

1207. EDLIN, H. L. **Early state encouragement of forestry [in Great Britain].** *Quart. J. For.* 51 (3), 1957 (223–9 + 1 photo). 6 refs.

1208. BOLTON, LORD. **Seventy-five years of private forestry in England and Wales.** *Quart. J. For.* 51 (3), 1957 (203–14).

1209. VIETINGHOFF-RIESCH, A. VON. Abriss der Oberlausitzer Forstgeschichte im Rahmen der deutschen Forstgeschichte. **[Sketch of the forest history of the Oberlausitz within the general framework of German forest history.]** *Arch. Forstw.* 6 (2/3), 1957 (192–202). [G.g.russ.e.]

1210. NOŽIČKA, J. Z minulosti slezských lesů: nástin jejich vývoje od nejstarších časů do r. 1914. **[The history of the Silesian forests: an outline of their development from the most ancient times to 1914.]** Slezský Studijni Ústav, Opava. 1956. pp. 129. 56 refs. [Cz.g.]

With indexes of personal and place names.

1211. TORNAR, G. Indagine storico-economica sulla consistenza della superfici boschive in Toscana sul finire del 1800. **[Historical-economic data on the forests of Tuscany since 1800.]** *Monti e Boschi* 8 (6), 1957 (255–64). [It.f.e.]

The forest area in 1880 was only 55% of that in 1800. A comparison is made between yields of different assortments in 1880 and 1956.

903. Forest Policy, General

See also No. 1226.

1212. Ein neues Long-Term-Programm. **[A new long-term programme [for Austrian forestry].]** *Holz-Kurier, Wien* 12 (26), 1957 (1–4). [G.]

Gives data on the extent of afforestation and reforestation, roadbuilding etc. for the period 1949–55 and the financing of these works (including ERP loans and subsidies), and outlines a 30-year improvement programme based on the findings of the forest survey. Apart from protection forests, plantation work on 220,000 ha. is planned, mostly on small holdings, at a total cost of over 2500 million Schillings and it is envisaged that a similar sum will be spent on roads, ameliorations etc.

1213. [ERSKINE CHILDERS] **Policy statement on Irish Forestry by the Minister of Lands.** *Irish For.* 15 (1), 1957 (6–12).

Extracts from the Minister's speech to the Dáil when presenting forestry estimates, 24 April, 1957.

1214. STEVEN, H. M., and MCNEILL, W. M. **The desirable balance between hardwood and softwood production in Great Britain.** Forestry Commission, London. 1957. pp. 10. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

1215. HARRIS, A. C., and NUNN, G. W. M. **The desirable balance between hardwood and softwood production in Western Australia.** Government Printer, Perth. 1957. pp. 3. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

1216. ENTRICAN, A. R. **The influence of markets on silviculture.** New Zealand Forest Service, Wellington. 1957. pp. 19. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

Supply, demand and integrated uses of exotic softwoods (especially *Pinus radiata*) in New Zealand.

904. General Regional Accounts of Forests and Forestry

See also No. 138.

1217. **Forestry study tour [in Czechoslovakia]: silviculture of pure and mixed stands. 23 July–17 August 1956.** FAO, Rome. No. *FAO*/56/6/4388, 1956. pp. viii + 55. Limited distribution.

Gives an account of soils, climate and forests of Czechoslovakia, ecology of the main forest types, and the historical and economic origins of pure

stands; describes the unfavourable consequences of pure stands, and indicates measures to be taken against them.

1218. **Indigenous woodlands in Southern Rhodesia.** Southern Rhodesia Forestry Commission, Salisbury. 1957. pp. 13. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957).

An account of the forests (largely *Baikiaea* forest with *B. plurijuga* dominant), their silviculture, protection, management, exploitation etc.

1219. **Statement for Southern Rhodesia [on forests and forestry.]** Government Printer, Salisbury. 1957. pp. 20. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

1220. **Statement by the Forest Department of Kenya Colony.** Government Printer, Nairobi. 1957. pp. 20. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

1221. SANGSTER, R. G. **Forestry in Tanganyika 1951–55.** Government Printer, Dar es Salaam. 1957. pp. 17. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

1222. ROSAYRO, R. A. DE. **Forestry in Ceylon, 1951–55. Statement prepared by the Forest Department, Ceylon.** Government Press, Ceylon. 1957. pp. 14. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.

1223. **Canada's forests 1951–1955.** Forestry Branch, Ottawa. 1957. pp. 75. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

1224. **Official statement prepared for the British Commonwealth Forestry Conference 1957 by the New Zealand Forest Service.** Government Printer, Wellington. 1957. pp. 36. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

905. Forest Statistics and Resources

See also Nos. 1211, 1219–24, 1240.

1225. **The productive potential of Europe's forests. Note by the Secretariat.** [*Docum.*] *9th Sess. FAO European For. Comm., Rome 1957* No. *FAO/EFC-57/26*, 1957. pp. 17. Limited distribution.

Gives the findings of a Working Party on the possibility and desirability of producing felling forecasts for 5–10 years ahead for European countries, recommends that this should be done at 5-year intervals, and summarizes information provided by member countries on the nature and sources of their available figures.

1226. SCHRÖDER, G. Ökonomische Probleme des zweiten Fünfjahrplanes in der Forstwirtschaft. **[Economic problems of forestry in the second five-year plan in E. Germany.]** *Forst u. Jagd* 7 (4–8), 1957 (145–8; 197–8; 248–52; 292–7; 338–41). [G.]

Gives some of the statistical data, assumptions and targets embodied in the plan for 1956–60 regarding growing stock and yield, wood consumption, imports, reforestation etc., and explains some of the working of the plan as it affects the demands made on the various districts.

1227. NORDQUIST, M. Om olika riksavverkningsberäkningar. **[Different calculations of permissible cut for Sweden.]** *Svenska SkogsvFören. Tidskr.* 55 (1), 1957 (37–43). [Sw.]

Gives tabular summaries of figures from different sources (mainly of 1931–56) showing the calculated cut for timber and small wood for the whole country and for N. Sweden separately.

1228. Metsätilasto: kertomus metsähallinnon toiminnasta v 1955. **[Forest statistics: report on the [Finnish] State Board of Forestry in 1955.]** *Suomen Virallinen Tilasto* (*Ser. XVII*). No. 44, 1957. pp. 59. [Fi.Sw.e.]

1229. BUCHHOLZ, E. Forstwirtschaft der Baltischen Staaten. **[Forestry in the Baltic States.]** *Holz-Zbl.* 83 (106), 1957 (1290, 1292). [G.]

Forest statistics for Lithuania, Estonia and Latvia, taken from an article in *Lesn. Hoz.* No. 7, 1957.

1230. **Forest and forest products statistics: Canada.** *Bull. For. Br. Can.* No. 106 (rev.) 1957. pp. 70.

In the present edition all previously published information is presented, several new tables are added, and statistics for primary forest production have been revised for 1940–54. [Cf. *F.A.* 14 No. 1814.]

1231. LOOMIS, R. D. **Alberta's forest resources and forest management.** *Pulp Paper Mag. Can.* 58 (6), 1957 (108–13).

907. Indirect Significance of Forests (Rural Amenity, National Parks, Forest Influences etc.)

See also section 116.

1232. **[Nature protection and wildlife management.]** *Schweiz. Z. Forstw.* 108 (7/8), 1957 (369–465 + 8 plates). Many refs.

A special number, with articles in French or German on nature protection, national parks, wildlife and game management etc. in Switzerland (7), Czechoslovakia (2), Netherlands, Canada, Poland and Jugoslavia (1).

1233. PEARSALL, W. H. **Report on an ecological survey of the Serengeti National Park, Tanganyika.** *Oryx* 4 (2), 1957 (71–136 + 1 map). 37 refs.

Covers game movements; human, cattle, and game populations; water quality, supplies and conservation; soils and vegetation (including mountain forest); park organization and development; and proposed boundaries. Recommendations are: a game park in the Serengeti and one for game, forest and water conservation in the Crater highlands, with a connecting corridor; the exclusion of pastoralists, and range development for them outside; and research on game habitats and conservation.

91. Land Use, Land-Use Policy (including Afforestation Policy)

See also Nos. 410–1, 1263.

1234. MARCH, E. W. **Forests and land planning.** Government Printer, Enugu, Nigeria. 1957. pp. 8. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

The author's main theme is that forests in the past have been the raw material of all land-planning; at the present time their role is debatable; in the future their existence is imperative. Instances of the relationship between foresters and land planners are quoted from recent history. The present-day arguments for and against all types of forest reservations are evaluated. The author concludes with a strong case for the retention as forest of every possible acre available. *Author's summary.*

1235. MACGREGOR, J. J. **European and Near East experience of planned land use.** Forestry Commission, London. 1957. pp. 14. 19 refs. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

1236. BERESFORD-PEIRSE, Sir H. **Planned land use and the classification and dedication of land for forestry [in Great Britain].** Forestry Commission, London. 1957. pp. 6. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957).

1237. SWABEY, C. **Selection and dedication of land for forestry use in Uganda.** Uganda Forest Department, Entebbe. 1957. pp. 5. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

A short history of forest reservation in Uganda is given. The principle of an arbitrary % reservation target is rejected. The need of quantitative forecasting of possible future forest-products demands is stressed. It is suggested that any forecast must give the forester time to grow the crop, i.e. it must be for at least a rotation ahead. *Author's summary.*

1238. HARRIS, A. C. **Planned land use and the classification and dedication of land for forestry in Western Australia.** Government Printer, Perth. 1957. pp. 4. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

1239. ANGUS, J. R. **Evolution of a policy related to planned land use and the forest estate [in Fiji].** Government Press, Suva, Fiji. 1957. pp. 7. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand 1957.)

1240. LACK, C. E. **Forestry development in Natal.** *J. S. Afr. For. Ass.* No. 29, 1957 (19–30).

Includes data on timber requirements, private afforestation, and state afforestation in Zululand (the Forestry Department afforestation scheme and the S.A. Native Trust afforestation scheme).

92. Forest Ownership and Ownership Policy

See also Nos. 852–3, 1208.

1241. BURGER, D. De plaats en de functie van het particuliere bos in ons land. **[The position and function of private forests in the Netherlands.]** *Ned. Boschb.-Tijdschr.* 29 (7/8), 1957 (177–90). [Du.e.]

1242. YOHO, J. G., JAMES, L. M., and QUINNEY, D. N. **Private forest landownership and management in the northern half of Michigan lower peninsula.** *Tech. Bull. Mich. agric. Exp. Sta.* No. 261, 1957. pp. 56. 6 refs.

1243. Omarrondering av skogsmark. **[Consolidation and rounding off of forest estates.]** *Svenska SkogsvFören. Tidskr.* 55 (3), 1957 (245–91). [Sw.]

Three papers with discussion: The surveyor's view-point (*L. Lindskog*); Exchange of land between the Crown and company forests (*E.-F. Malmgren*); and The problem of farm forests (*L. Kallstenius*).

93. Public Supervision and Regulation of Forestry, including Legislation for these Purposes

See also Nos. 1207–8.

1244. TRIFONE, R. Uno sguardo alla storia del diritto forestale in Italia. **[The history of forest law in Italy.]** *Ital. for. mont.* 12 (1), 1957 (12–21). [It.it.f.]

94. Other Methods to Implement Forest Policy

See also Nos. 1207–8.

945. Advisory Services; Publicity, Propaganda; Education, Training; Research

945.1. Advisory and Information Services, Documentation Centres

1245. **Forest bibliography: use and development of the Oxford Decimal Classification and co-operation of national forest bibliography centres at international level.** *Unasylva* 11 (3), 1957 (124–7).

1246. FORD ROBERTSON, F. C. **The work of the Commonwealth Forestry Bureau Oxford 1952–1957, a progress report.** Forestry Commission, London. 1957. pp. 13. 6 refs. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

945.3. Education. Training. (Including Educational Tours and Information on Careers.)

See also No. 1257.

1247. CHAMPION, Sir H. G. **Thoughts on higher forestry education.** Forestry Commission, London. 1957. pp. 7. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

1248. CHAMPION, Sir H. G. **The Imperial Forestry Institute between 1947 and 1956.** Forestry Commission, London. 1957. pp. 16. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

1249. Forstliche Lehre und Forschung in Österreich. **[Forestry teaching and forestry research in Austria.]** *Allg. Forstztg.* 68 (11/12), 1957 (149–75). Many refs. [G.]

Describes the organization, syllabus etc. of the 4-year-course at the Hochschule für Bodenkultur, Vienna, and organization and research programme at the Mariabrunn-Schönbrunn Forest Research Station.

1250. Swabey, C., and Bacon, D. W. G. **The development of forestry training in Uganda.** Uganda Forest Department, Entebbe. 1957. pp. 4. 6 refs. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

The development of the Uganda Forest School for the training of African Foresters and Rangers is recorded.

1251. Entrican, A. R. **Forest education and training in New Zealand.** Government Printer, Wellington. 1957. pp. 15. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

1252. **Forestry: Choice of Careers (n.s.) No. 81.** H.M. Stationery Office, London. 1957. pp. 36. Price 1*s.* 9*d.*

A booklet on training, wages, prospects etc. in the U.K., put out by the Central Youth Employment Executive.

945.4. Research

See also Nos. 877–80, 1248–9, 1263.

1253. Laurie, M. V. **Planning a forestry research programme.** Forestry Commission, London. 1957. pp. 7. 1 ref. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

In forest research the possible subjects for investigation tend to exceed the resources available, and it is essential to plan the programme well ahead within the limits of finance available. Many experiments are of a long-term character, and it is essential to retain the more informative established trials, whilst discarding those that have served their purpose. Much work consists of *ad hoc* investigations into immediate practical problems, but much must be regarded as long-term fundamental research which can only slowly justify itself by results. An outline is given of the planning and control of research work by the Forestry Commission of Great Britain. *Author's summary.*

1254. Jahrbuch 1953/1954 der Deutschen Akademie der Landwirtschaftswissenschaften zu Berlin. **[Yearbook 1953/54 of the German Academy of Agricultural Sciences, Berlin.]** Akademie-Verlag, Berlin, 1955. pp. 421. Many refs. [G.]

Describes the structure and membership of the Academy and its affiliated institutes and research stations, among them the forest research institutes at Eberswalde and Tharandt, covering their sections, substations, experimental areas etc., senior staff and research in progress, and listing publications.

1255. Allegri, E. Rapport au gouvernement de l'Iran sur l'établissement d'un centre de recherches forestières. **[Report to the Government of Iran on the setting up of a forest research centre.]** Expanded Technical Assistance Program, FAO, Rome. *FAO Report* No. 541, 1957. pp. 60. [F.] Limited distribution.

[Cf. *F.A.* 18 No. 3607.] Includes an appendix (40 pp.) on Poplar breeding and research in Iran.

1256. **Research programme progress report 1956.** *Res. Pamphlet For. Res. Inst. Kepong* No. 15*C*, 1957. pp. 53.

1257. **Forestry research at the Canadian universities.** *Pulp Paper Mag. Can.* 58 (7), 1957 (224 . . . 247). 3 refs.

A panel discussion on: Personnel (*G. S. Allen*); Financing (*J. W. B. Sisam*); Research facilities (*L. Z. Rousseau*); and Implementation (*J. M. Gibson*), with introductory remarks by *L. Besley.*

1258. Progreso realizado en las investigaciones agrícolas en la campaña 1954–1955. **[Progress achieved in agricultural research [in Argentina] during 1954–1955.]** *Idia* No. 106/108, 1956. pp. 304. Many refs. [Span.] C.G.B.

Presents accounts of work done at the government experiment stations throughout Argentina. The following forestry projects are included: attack of *Tuberolachnus saligna* on Willow, and of *Platypus sulcatus* on Poplar; species resistant to nematode attack; natural enemies of *Pterocomma populea*; frost resistance of Eucalypts; growth of Eucalypts and *Pinus caribaea* in Concordia; species for shelterbelts.

1259. Reid, J. S. **Integration of forest research and forest products research.** Government Printer, Wellington. 1957. pp. 8. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

With particular reference to New Zealand.

1260. Kessell, S. L. **Finance for forestry and forest and timber research in Australia.** [Commonwealth Forestry and Timber Bureau, Canberra.] 1957. pp. 8. (Seventh British Commonwealth Forestry Conference, Australia and New Zealand, 1957.)

1261. Rapports d'activité des commissions nationales depuis 1947 ou depuis leur création. Rapport du Secrétariat. **[Progress reports of the National [Poplar] Commissions since 1947 or since their foundation. Secretariat report.]** [*Docum.*] *9th Sess. int. Poplar Comm., Paris 1957* No. *FAO/CIP* 86, 1957. pp. 23. [F.] Limited distribution.

Summarizes reports of 10 European countries.

946.1. Associations. Societies

1262. Davidson, J. E.; Gardner, R. C. B. **The history of the Royal Forestry Society of England and Wales. [1] The first fifty years. [2] The last twenty years.** *Quart. J. For.* 51 (3), 1957 (191–202).

1263. 10 Jahre Lignikultur im Dienste des Flurholzanbaus. **[Ten years of 'Lignikultur' in the service of timber production outside the forest.]** Lignikultur, Gesellschaft für Holzerzeugung ausserhalb des Waldes e.V., Reinbek. 1956. pp. 52. 91 refs. [G.]

An illustrated description of the aims, organization, past achievements and future programmes of

the Society, and particularly of its research station at Reinbek, which at present concentrates on Poplars.

946.2. Conferences and Excursions

1264. **Proceedings of the First Pakistan Silvicultural Conference 1957.** [Forest Research Institute, Abbotabad.] 1957. pp. 41.

A short summary of the proceedings, and resolutions, with lists of research projects in order of priority.

97. International Forest Policy and Other International Collaboration

971. Congresses, Conferences

1265. **Report of the first meeting of the European contact group on the uses of isotopes and radiation in agricultural research, held in Wageningen, Netherlands 10–14 December 1956.** *Meeting Report Agriculture Division, FAO, Rome* No. 1956/27, 1956. pp. 39.

1266. Rapport de la Conférence régionale du peuplier pour l'Amérique latine. Buenos Aires, 1957. **[Report of the Latin American Poplar Conference, Buenos Aires, 1957.]** [*Docum.*] *int. Poplar Comm.* No. *FAO/CIP*/84, 1957. pp. 36. 56 refs. [F.]

Contains recommendations on sites, planting techniques, varieties, utilization etc., and research needs, with annexed papers on fungus diseases (*C. Jauch*), insect pests (*J. A. Pastrana*) and identification (*A. Ragonese*) of Poplars and Willows in Argentina, the last dealing more particularly with the natural hybrids of *Salix humboldtiana* and exotic Willows (*Salix* × *argentinensis*).

972. Organizations

See Nos. 1261, 1266.

FORESTRY THE WORLD OVER

References: 1. *Annual Report of Gold Coast For. Dep. 1956*; 2. *Australian Timber Journal*, Sydney; 3. *CPPA News Bulletin*, Montreal; 4. *Chêne-Liège*, Constantine, Algeria; 5. *FAO Forestry Newsletter for the Near East*, Cairo; 6. *Holz-Zentralblatt*, Stuttgart; 7. *India News*, London; 8. *Indian Forester*, Dehra Dun; 9. *Irish Forestry*, Dublin; 10. *NRC Research News*, Ottawa; 11. *New Zealand Timber Journal*, Wellington; 12. *Skogen*, Stockholm; 13. *Soil Conservation*, Washington; 14. *Timber & Plywood*, London; 15. *Timber of Canada*, Ottawa; 16. *Timber Trades Journal*, London; 17. *Unasylva*, Rome; 18. *World Crops*, London.

International.

Conferences

A meeting of the FAO/ECE joint committee was held in Moscow in September and followed by a 10-days' tour to study Russian forest working techniques at first hand.

1958

April	4th FAO Wood Technology Conference	Madrid
20–31 Aug.	6th Session, Latin America Forestry Commission	Guatemala
11–19 Sept.	6th General Assembly of the International Union for the Conservation of Nature	Athens

Australia. Workmen laying pipes in a Hobart suburb found a fossilized tree, 155 ft. long and 2 ft. 6 in. in diameter. The tree is completely fossilized and older than basalt in the same neighbourhood (possibly 20 million years old). It was resting in the ground before the present Eucalypt flora was growing in Australia (**11**; July 1957).

A recent fire in a Sydney office has proved conclusively the superiority of wood to steel for filing cabinets, the files and records lodged in steel cabinets being generally burned beyond recognition while those in the wooden ones were smoke-stained but in nearly every case still legible (**2**; Aug. 1957).

Belgium. A law on the inspection of forest seeds and planting stock was promulgated in 1956. Its purpose was to establish, side by side with the free market, one under State control in which producers who wished to do so might participate. Élite stands are selected by the Forest Research Station at Groenendaal, and lists of these regularly published. The Station also fixes and publishes seed-production standards (by unit weight of cones) and standards of planting stock (by unit weight of seeds). Harvesting of seed is supervised by officials of the Administration des Eaux et Forêts, and preparation of seed and standard of planting stock by a national marketing office (**17**; [Nov.] 1957).

Canada. Experiments by Canadian government and private research agencies have shown that lignin can be used to give longer life to tyres, particularly the large-diameter tyres used in military vehicles. In exhaustive road tests carried out in Texas, tyres having synthetic-rubber treads reinforced with lignin showed 15% more resistance to wear than conventional types. The lignin used was a by-product of alkaline pulp manufacture (**10**; Aug. 1957).

In celebration of the centenary of British Columbia, a royal totem pole is to be presented to Her Majesty the Queen next year for erection in one of the Royal Parks. The pole is a 100-ft. Cedar, estimated to be 600 years old, with butt and top diameters of 7 ft. and 26 in. respectively, and weighing about 30,000 lb. Chief Mungo Martin, last of the great totem sculptors, is carving it, assisted by his son (**15**; Nov. 1957).

Egypt. The Forest Service has started a Forestry Museum containing a collection of tree seeds and wood samples of all indigenous and introduced species of economic importance, and examples of manufactured goods (furniture, parquet flooring etc.). It is intended to exhibit the collection in all important towns, with a view to persuading the population of the economic importance of tree planting (**5**; 1.9.57).

Germany. In one of the houses shown at the 'Interbau' international building exhibition at Berlin, the final lay-out of each flat is left to the tenant. The rooms are formed by movable partition walls, consisting of 2 layers of plywood enclosing an insulating filling, which are wedged against floor and ceiling and against each other (**6**; 5.9.57).

Ghana. A match factory will commence production at Kade in November, using local-grown Silk-Cotton timber. Initial output will be ca. 100,000 boxes a day and this will eventually be stepped up to 1,500,000 boxes. It is understood that Silk-Cotton was chosen, after a great deal of experiment, because it has the advantage of easy accessibility and, apart from its kapok, has no other commercial value (**14**; 26.9.57).

Large sea-going dug-out fishing canoes require very large and well-shaped Wawa (*Triplochiton scleroxylon*) trees from relatively accessible sites, owing to the difficulty of transporting the finished article. Canoe-makers generally pay £5 royalty per tree for suitable trees, while normal royalties are £1 to £1. 10*s.* (**1**; 1957).

Great Britain. Laboratory tests at the Forest Products Research Laboratory, Princes Risborough, confirmed that Nuodex 87, a liquid concentrate produced by Nuodex Ltd., Birtley, Co. Durham, gives effective protection against dry rot when brushed on wood, brick or plaster surrounding areas irreparably attacked, and against mildew (**16**; 12.10.57).

India. An advanced diploma course in pulp and paper technology has been inaugurated at the Forest Research Institute, Dehra Dun. It is designed for graduates in chemical engineering, to equip them for responsible posts in pulp and paper mills. It is hoped later to start a certificate course to train technicians for the Indian paper industry (**8**; Oct. 1957).

Under the recent Indo-Finnish agreement, four Indian officers will study modern methods of forestry and better utilization of forest products, in Finland (**7**; 14.9.57).

Norway. The professional school for forest workers at Sønsterud, the only one of its kind in the world, has just celebrated its 10th anniversary. Up to the present, more than 2700 students have attended courses on use and maintenance of forest tools and equipment, and correct methods to lessen muscular strain, accidents, etc. A new course on the maintenance of cableways has just been opened. There are also elementary courses for young (15- to 18-year-old) workers (**4**; 15.9.57).

Republic of Ireland. A new forestry school has been opened at Shelton Abbey, Arklow. It will accommodate 40 students, who will complete there the 2nd and 3rd years of study for posts as foresters in the State Forestry Service, having already spent their first year at the practical training centre at Kinnitty Castle (**9**; Summer 1957).

Sweden. A plant nursery has been established on 42 ha. of a reserve airfield at Larslund, Stigtomta, on a 5-year lease, subject to 2 years' notice. An old army garage, covering 450 sq.m. and easily dismantled and moved, serves for offices, sorting shed and garage. Water is pumped from a near-by gravel pit. So far 15 ha. have been cultivated and contain a stock of 950,000 2 + 1 Spruce, 240,000 2 + 1 Pine, 24,000 1 + 1 Pine and a large quantity of seedlings (**12**; 15.10.57).

U.S.A. An important function of Pine trees grown on farms in Louisiana is to produce Pine 'straw', i.e. dead Pine needles for mulching strawberry plants. Two acres of well spaced Pines will produce enough straw to mulch one acre of strawberries, but if the trees are crowded, less needle litter is produced. On one farm the thinning of an overcrowded Pine stand resulted in a 50% increase in needle litter, and provided enough straw to mulch 20,000 more strawberry plants, which represents a saving of $75.00 (**13**; Sept. 1957).

A chemical made by the American Paint Co. is said to have given encouraging results against bracken, destroying its root structure. It was applied by air from an Augusta Bell helicopter fitted with 40 spray nozzles (**18**; [Nov.] 1957).

Fibrous effluent from an Oregon hardboard plant is being used to plug holes in irrigation ditches on neighbouring orchard land. A 30% reduction in water leakage from the irrigation system is reported since the introduction of the material, which is effected by pumping it into the irrigation ditches (**3**; Oct. 1957).

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